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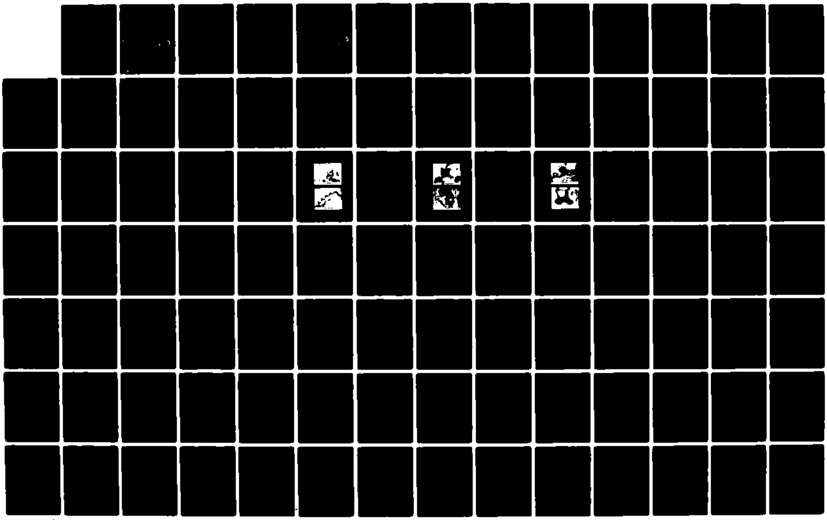

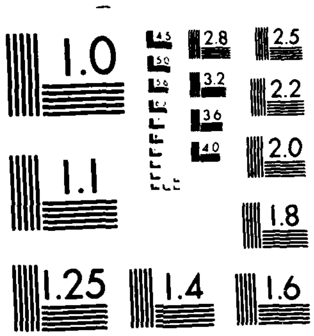

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Final Interim Report

Archaeological Investigations in the Upper Tombigbee Valley, Mississippi: Phase I

Judith A. Bense, Editor

With the Assistance of

Jerry R. Galm and David H. Dye

CONTRIBUTIONS BY

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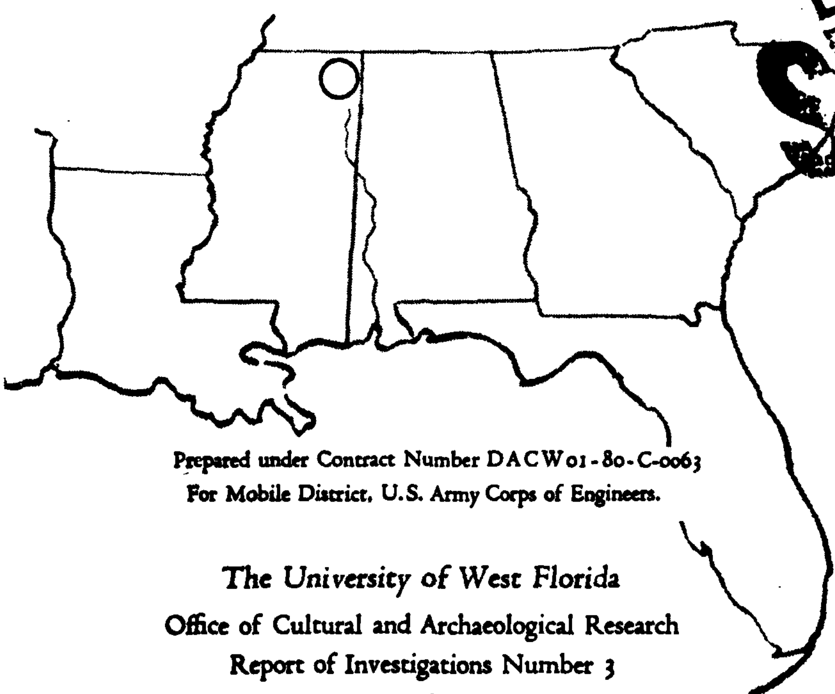
H. Blaine Ensor, David E. Pettry, Harry F. Reed, III,
Michael J. Rodeffer, Robert R. Ryan, Elisabeth S. Sheldon,
and Joseph M. Studer

Volume 4.



Prepared under Contract Number DACW01-80-C-0063
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The University of West Florida
Office of Cultural and Archaeological Research
Report of Investigations Number 3
1983

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Block 20 - Abstract

This document is a report of archaeological investigations at eleven sites in the Canal and River Section of the Tennessee-Tombigbee Waterway. These investigations include the excavation of four sites and the testing of seven others. This report is a description of this project and includes the research design, a summary of the archaeological background, and a full description of the data recovery methods and techniques. For each site investigated in the project, a complete report of the specific procedures and a description of the results are provided. A summary of the total results is also contained in the final chapter. Attached to the report are a series of special studies, manuals for field, laboratory and data methods, and the original detailed research design. Also included is a complete data set on microfiche which presents the location, classification and measurement of all specimens recovered in the project.

The results of this 15 month field effort contributed much to our understanding of the Archaic and Gulf Formational State, specifically, the Early Archaic (Kirk), initial Late Archaic (Benton), and late Gulf Formational (Alexander). Isolated components of these cultures have been recovered and provide primary data for the reconstruction of chronology and lifeways of these portions of the prehistoric occupation of the Upper Tombigbee Valley. With additional, more intensive study of the recovered material, it will be possible to address the cultural process issue of adaptation to the post-glacial climate maximum, the Altithermal. Obvious differences in site use and area settlement pattern, subsistence strategy and scheduling, and technology were employed between ca. 6500 and 5500 B.P.

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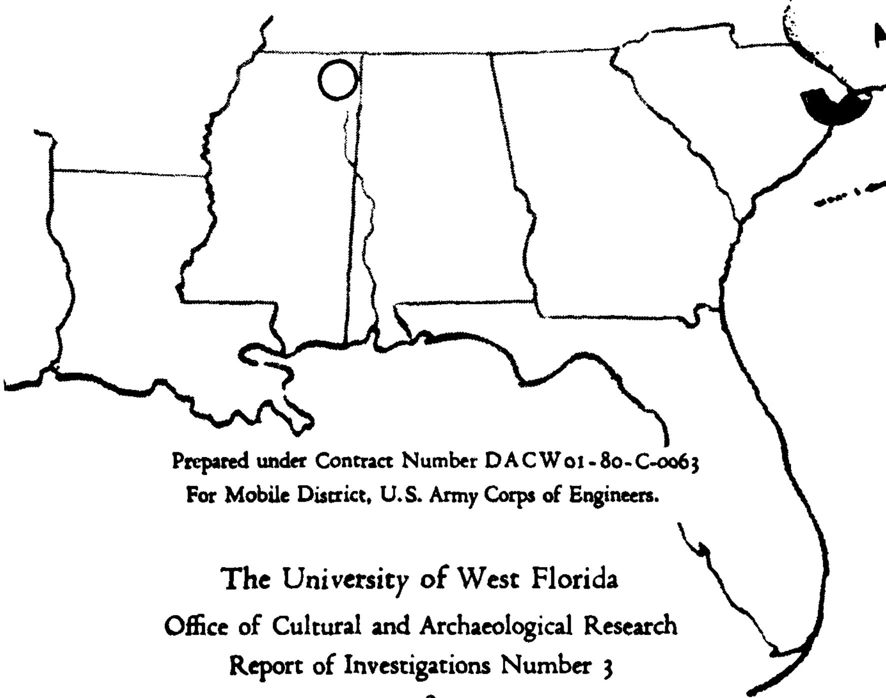

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APPENDIX I

SUMMARY OF MATERIAL DISTRIBUTION
AND
TOOL MEASUREMENT STATISTICAL SUMMARY

INTRODUCTION

Appendix I contains the summarized data for all eleven sites investigated in Phase I. Due to the bulk of this information, it has been microfiched for ease of handling and efficiency. The microfiche cards in the packets are designated Appendix I. There are two types of information for each site presented in this Appendix: block and level summaries and stone tool measurement summary statistics.

The block and level summary tables are standardized for all sites except 22MO531. The tables contain all material recovered in each excavation block, regardless of size, by 10 centimeter levels. The numbers of specimens in each row and column represent the sum total of all items except those in features. The material contained in each feature is presented in Appendix II of this report. The data for each block on each site is presented in a series of tables organized by the groupings below:

- Prehistoric Ceramics
- Miscellaneous Fired Material
- Projectile Point/Knives
- Cores, Preforms, and Biface Blades
- Miscellaneous Chipped Stone Implements
- Ground Stone Artifacts
- Non-utilized Lithic Debitage
- Introduced Rock (by weight)

The material distribution summary for 22MO531 is presented differently due to the unusual nature of the site (high small mound) and the field techniques (trenching, no block units). The material is presented by excavation unit coordinates and 10 centimeter levels. See Chapter 13 for an explanation of the level designations. The material in each level is listed by specimen category with counts and weights given.

The tool measurement summary statistics are presented by tool type and category. The measurements taken for each tool are defined in the Laboratory Manual (Appendix IV) of this report. In the tables presented here, all measurements for each tool type are summed and the number of measured specimens presented. Then six statisical calculations are made on each dimension: mean, standard deviation, minimum value, maximum value, range, and variance. The tables are organized by the following tool groupings:

- Projectile Point/Knives
- Biface Blades
- Preforms
- Cores
- Scrapers

Drills, Perforators, etc.
Uniface and Biface Tools
Ground Stone Tools

In the text of this report, especially the individual site discussions (Chapters 5 through 14), the data in this Appendix is referred to frequently. In order to use this Appendix efficiently, the organization is primarily by site. Within a site, the material distributions are organized by blocks in alphabetical order and then by the groupings listed above. Following this will be the tool measurements summary statistics also in the order presented above.

APPENDIX III

SPECIAL STUDIES REPORTS

INTRODUCTION TO APPENDIX III

This appendix contains the reports of six special studies performed during Phase I of this project. These studies included phytolith analysis, a human osteological study, two lithic analyses and evaluations, a geomorphological comparison of two sites, and a study of the lithic raw materials used for stone tools. Five of these studies were performed by outside consultants, and one (the last listed above) was conducted internally.

The reports to follow are pesented as received from the authors. Each is a complete unit with references (when necessary). The style and format of the reports varies with each individual and no attempt has been made to edit or integrate them.

A detailed study of the soils and sediments from the four excavated sites was also made by Pettry (22IT539, 563, 576, and 590). The reports of his work have been incorporated into the text of the reports of these sites (Chapters 5,6,7, & 8 of this report).

The purposes of the outside studies were to evaluate data sets beyond the expertise of the project staff and to monitor the quality of out lithic analytical system. Much was learned from these studies and many suggestions were incorporated into the project at an early stage. Other suggestions will serve as baseline for the research design of Phase III of this project.

RESULTS OF A PRELIMINARY PHYTOLITH ANALYSIS OF BIOSILICATE SAMPLES FROM SITES 22IT576 AND 22IT539

by

George Rapp, Jr.

University of Minnesota
Duluth, Minnesota 55812

June, 1981

INTRODUCTION

A phytolith is a deposit of opaline silica ($SiO_2 \cdot nH_2O$) formed in a plant cell (lumen or wall) and subsequently deposited in sediments. Phytoliths have many shapes and range in length from less than 2 microns to 1 millimeter. Most phytolith studies have emphasized the 5 to 50 micron fraction, encompassing mostly phytoliths formed in cell lumen, but more work is now being done on smaller fractions (Wilding and Drees 1974). Phytoliths are abundant in the families Graminea, Juncaceae, Cyperaceae, and Equisetae but are also found in other plant families. Phytoliths were first reported over 100 years ago, but intensive studies date only after the mid-1900s.

Twiss, Suess, and Smith (1969) established a morphological classification of phytoliths and correlated three classes to three subfamilies in the Gramineae. Phytoliths from various sediments were then used as indicators of the presence of the subfamilies. This study established the potential of phytolith studies for paleoenvironmental reconstruction.

Plants are not represented by a single phytolith but rather by an assemblage of phytoliths (Moody 1972). Not only does a plant contain an assemblage of phytoliths, each plant part (e.g., stem, fruit, root, leaf) may also possess a different assemblage. Many phytolith types occur in several genera, thus making it harder to distinguish between plants. Because of the variability in the phytolith assemblages found in a plant, it may be hard to identify individual taxa.

The deposition of phytoliths for the most part is local. Therefore it is most likely that phytolith assemblages will represent local vegetation decomposing in situ.

Phytoliths provide a complimentary study to pollen as vegetal and environmental indicators. In comparison to pollen studies phytolith studies are in their infancy. The number of phytoliths necessary to obtain reproducible results is as yet unknown (Collins 1979). Pollen grain counts of 300 grains per sample is considered statistically valid and reproducible. Differential production of phytoliths and pollen grains per plant is common. This leads to overrepresentation or underrepresentation of some taxa. At present phytolith production for plants is known only in a general way.

Phytolith preservation is superior to pollen preservation in most environments and can yield valuable information for vegetational and environmental reconstruction. Pollen grains are representative of most plants to the genus or species level. In Gramineae, pollen cannot be used in identification past the family level. Phytoliths may also be used to establish the presence of low-

pollen-producing or insect pollinated plants which are often not represented in the fossil record.

Archaeological applications of phytolith studies began after Rovner (1971) summarized the potential. Phytolith studies appear to be useful for studies of plant use and domestication as well as paleoenvironmental reconstruction. Moody (1972) reconstructed a regional vegetation using phytoliths from a bog and an archaeological site in Washington. Carbone (1977) reconstructed vegetation and climatic sequences at a site where pollen was not preserved. Pearsall (1978) demonstrated that corn was planted in Ecuador earlier than had been hypothesized. Lawrence Kaplan (personal communication 1980) has presented a detailed study of early cereal domesticates in Egypt. Most of the important agricultural crops are Gramineae.

BACKGROUND

Of the problems which exist in methodology, the classification and decription of phytoliths is one of the most immediate. Individual phytoliths have been described using both light and electron microscopy. Each instrument has advantages and disadvantages. The electron microscope provides better three-dimensional descriptions, but nonoverlapping counts are best made on the light microscope. However, the correlation of descriptions from the two different instruments is sometimes difficult, causing problems during the counting of phytoliths for assemblage analysis. Most plant identifications are made on the basis of quantitative assemblages rather than diagnostic individual phytoliths.

Variation within plant individuals and taxa is another aspect of assemblage determination. Due to the manner of phytolith production, several shapes are produced in each plant. Often, these shapes are not unique to the species level. Therefore, descriptions must include percentages of shapes as well as actual descriptions of shapes. Further scanning electron microscope (SEM) work may reveal diagnostic characteristics of some phytolith shapes that today are not considered diagnostic. Variation must be studied using modern species of a plant before the plant can be positively identified in archaeological sediments.

Two general levels of identification have been investigated: species and higher taxonomic groups. A presence/absence study for *Zea mays* was made using shape and size information of a particular phytolith shape by Pearsall (1979). The Archaeometry Lab has concentrated on identifying several species in sediments using a computer analysis to compare phytolith assemblages.

Alternatively, Twiss et al, (1969) optically identified three sub-families of the Gramineae during a study of Kansas sediments. Many soil science studies distinguish former tree versus grass vegetation areas by phytoliths. Carbone (1977) used cumulative frequency graphs of phytolith shapes to relate soil strata to modern forest and grass vegetation. However, identification of levels above that of species is not sufficient if the objective is determination of plant use.

Finally, problems exist in the interpretation of results. Provenience of the sediment and the vegetation information generated provide most of the information for interpretation. If paleoenvironmental reconstruction is the objective, phytolith transportation must be considered. The question of regional vs. local environment is also germane. If plant use is the objective, primary vs. secondary provenience must be considered. Site history, such as burning episodes and weed cover, also affects phytoliths in the sediments and must be considered in any interpretation.

ANALYSIS OF TENNESSEE-TOMBIGBEE MIDDEN MOUND PROJECT SAMPLES

Phytoliths were extracted from each sample and subjected to both scanning electron microscope (SEM) and Nomarski optical study for identification. Initially it was planned to compare the phytoliths extracted from the archaeological sediment samples with phytoliths extracted from common flora in the area and from suspected ancient foods, such as tubers. However, this part of the investigation was proposed and will be proposed as part of Phase III of this project.

For the purpose of this analysis a general description is presented for the phytolith component of each of the samples and a selection of photographs is included to indicate the nature of the phytoliths present. The descriptions are based on our (Archaeometry Laboratory) classification which is attached to this report (Attachment I).

PRELIMINARY BIOSILICATE ANALYSIS: 22IT539

The following are the results of the examination of the 10 sediment sample phytolith extracts from Site 22IT539 with the light microscope equipped with a Nomarski DIC attachment.

Sample #1527: Block A, 128S88W, Level 6 (Photos #1,2,3)

Contains a moderate amount of phytoliths. Nomarski examination showed smooth rods, oval double outline phytoliths, triangles, silicified bulliform cells, dumbbells, and rondels. Some phytoliths were more weathered than others.

Sample #1569: Block A, 128S90W, Level 7 (Photos #4,5)

Contains a fairly large number of phytoliths. Rondels, silicified bulliform cells, smooth rods, rods with side projections, rods with ring projections, and square double outlines were most common. Some of the phytoliths were more weathered than others.

Sample #1623: Block B, Feature 9 (Pit)

Contains phytoliths, but in lesser amounts than other samples. Silicified bulliform cells, saddles, and smooth rods were noted in the scan. Some of the phytoliths were more weathered than others.

Sample #1665: Block A, 128S88W, Level 8

Contains a moderate amount of opal, but only part of the opal consists of distinctive phytoliths. Smooth rods, rods with square/rectangular side projections, saddles, and a spine or a hook were seen in the examination.

Sample #1758: Block A, Feature 19 (Pit)

Contains a fairly large number of phytoliths. Saddles, smooth rods, spines, hats, silicified bulliform cells, silicified hairs, bottoms, rods - side projections - spines (triangular and pointed), plates with depressions, cones, and double outline phytoliths were all seen in the scan. Some of the phytoliths were more weathered than others.

Sample #1803: Block A, Feature 22 (Pit)

Contains a relatively small amount of phytoliths. Smooth rods, and possibly, some weathered hats were seen in the examination. Some phytoliths were more weathered than others.

Sample #1905: Block B, Feature 25 (Ceramic Cluster)

Contains a relatively large amount of phytoliths. Short dumbbells, long dumbbells, silicified bulliform cells, rectangles, bowls, smooth rods, plates with depressions, saddles, rods with rounded side projections, and rectangles were seen in the preliminary exam. Some phytoliths were more weathered than others.

Sample #1975: Block B, Feature 29 (Pit) (Photo #6)

Contains an extremely large amount of phytoliths. Smooth rods, silicified bulliform cells, oval double outlines, silicified hairs, rods with side projections, saddles, and rods with ring projections were seen in the scan. Some phytoliths were more weathered than others.

Sample #2486: Block B, 144S104W, Level 6

Contains a relatively small amount of phytoliths. Weathered rods, and silicified hairs were seen in the scan. Some phytoliths were more weathered than others.

Sample #2543: Block B, 144S104W, Level 6

Contains a relatively small amount of phytoliths. Rods with ring projections were noted.

PRILIMINARY BIOSILICATE ANALYSIS: 22IT576

Below are the results of the Nomarski examination of the 10 sediment sample phytolith extracts from Site 22IT576.

Sample #1265: Block D, 115S109W, Level 3

Contains a relatively small amount of phytoliths. Smooth rods, saddles, and dumbbells were seen in the examination. Some phytoliths were more weathered than others.

Sample #1458: Block D, 115S109W, Level 14

Contains a relatively moderate amount of phytoliths. Smooth rods, bowls, and possibly a saddle or a spool were seen in the scan. Some phytoliths were more weathered than others.

Sample #1697: Block D, 115W109W, Level 5

Contains a relatively small amount of phytoliths. Some smooth rods were seen in the exam.

Sample #1762: Block D, 115S109W, Level 6

Contains a relatively small amount of phytoliths. Rectangles, a broken dumbbell, and silicified bulliform cells were found in the preliminary scan. Some phytoliths were more weathered than others.

Sample #2179: Block A, Feature 46 (Pit)

Contains a relatively small amount of phytoliths. Smooth rods were noted in the scan.

Sample #2209: Block D, Feature 44 (Prepared Area)

Contains a moderate amount of phytoliths. Smooth rods, silicified bulliform cells, smooth plates, bowls, saddles, and spines were seen in the examination. Some phytoliths were more weathered than others.

Sample #2464: Block A, Feature 25 (Fired Aggregate)

Contains a moderate amount of phytoliths. Smooth rods, a possible spine base, squares, silicified bulliform cells, and plates with depressions were seen in the scan. Some phytoliths were more weathered than others.

Sample #2505: Block A, Feature 54 (Pit)

Contains a fairly large amount of phytoliths. Smooth rods, rods with ring projections, hats, bowls, rods with side projections, saddles, dumbbells, silicified bulliform cells, rootles, and a comb-like phytolith were all found in the examination. Some phytoliths were more weathered than others.

Sample #2582: Block D, 115S109W, Level 8

Contains a moderate amount of phytoliths. Silicified bulliform cells, smooth rods, long dumbbells, cones, and triangles were noted in the scan. Some phytoliths were more weathered than others.

Conclusions

While the abundance of phytoliths varies considerably among the samples, the Tennessee-Tombigbee Midden Mound samples contain sufficient phytoliths to warrant a detailed investigation using modern plants to develop an identification key. Paleoenvironmental and paleoagricultural reconstruction should be possible if comparable modern plant taxa can be utilized.

REFERENCES

Carbone, Victor A.
1977 Phytoliths as Paleoecological Indicators. In Amerinds and Their Paleoenvironments in Northeastern North America, edited by Walter Newman and Bert Salwin. Annals of the New York Academy of Sciences 288:194-205.

Collins, Susan M.
1979 Phytoliths as Indicators of Plant Use at Ancient Troy. M.S. thesis, Department of Anthropology, University of Minnesota.

Moody, Ula L.
1972 Phytoliths as an Interpretive Device of Paleo-environments in Archaeological Sites. Unpublished M.A. thesis, Department of Geology, University of Montana.

Pearsall, Deborah M.
1978 Phytolith Analysis of Archaeological Soils: Evidence for Maize Cultivation in Formative Ecuador. Science 199:177-178.

Rovner, Irwin.
1971 Potential of Opal Phytoliths for Use in Paleoecological Reconstruction. Quaternary Research 1:343-359.

Twiss, P.C., E. Suess, and R.M. Smith.
1969 Morphological Classification of Grass Phytoliths. Soil Science Society of America, Proceedings 33:109-115.

Wilding, L.P., and L.R. Drees.
1974 Contributions of Forest Opal and Associated Crystalline Phases to Fine Silt and Clay Fractions of Soils. Proceedings of the Clay Mineral Society, Clays and Clay Minerals 22(3):295-306.

ATTACHMENT I:

PHYTOLITH CLASSIFICATION AS OF FEBRUARY, 1981

I Boat

II Bowl
- A. Regular
- B. Minature

III Cell Form
- A. Sinuous
  - 1. Strongly
  - 2. Slightly
- B. Smooth-edged
  - 1. Long plateau
    - a. Rectangle
    - b. Square
    - c. Oval
    - d. Irregular circle
    - e. Triangle
  - 2. Short plateau
    - a. Square
    - b. Oval
  - 3. Irregular

IV Stemmed
- A. Club
- B. Pipe

V Cone
- A. Sharp
  - 1. Straight
  - 2. Hooked
- B. Blunt
  - 1. No base
    - a. Regular
    - b. Minature
  - 2. Base present
    - a. Ridges
    - b. No hairs
    - c. Some hairs
    - d. Hair-covered

VI Cross

VII Double Rim

VIII Dumbbell
- A. Bilobate
  1. Thin shaft and concave ends
     a. Normal
     b. Short
     c. Peanut
  2. Thin shaft and flat ends
     a. Normal
     b. Short
     c. Peanut
  3. Thin shaft and convex ends
     a. Normal
     b. Short
     c. Peanut
  4. Thin shaft and pointed ends
     a. Normal
     b. Short
     c. Peanut
  5. Thin shaft and mixed ends
     a. Normal
     b. Short
     c. Peanut
  6. Thin shaft and unknown ends - fence
  7. Medium shaft and concave ends
     a. Normal
     b. Short
     c. Peanut
  8. Medium shaft and flat ends
     a. Normal
     b. Short
     c. Peanut
  9. Medium shaft and convex ends
     a. Normal
     b. Short
     c. Peanut
  10. Medium shaft and pointed ends
     a. Normal
     b. Short
     c. Peanut
  11. Medium shaft and mixed ends
     a. Normal
     b. Short
     c. Peanut
  12. Medium shaft and unknown ends - fence
  13. Thick shaft and concave ends
     a. Rectangular
     b. Square
        1) Normal
        2) Short
  14. Thick shaft and flat ends
     a. Rectangular

b. Square
   1) Normal
   2) Short
15. Thick shaft and convex ends
   a. Rectangular
   b. Square
      1) Normal
      2) Short
16. Thick shaft and pointed ends
   a. Rectangular
   b. Square
      1) Normal
      2) Short
17. Thick shaft and mixed ends
   a. Rectangular
   b. Square
      1) Normal
      2) Short
18. Thick shaft and unknown ends - fence
19. Different views
   a. Side
   b. Bottom

B. Trilobate
   1. Regular lobes
      a. Concave ends
      b. Flat ends
      c. Convex ends
      d. Pointed ends
      e. Mixed ends
      f. Fence
   2. Irregular lobes
      a. Concave ends
      b. Flat ends
      c. Convex ends
      d. Pointed ends
      e. Mixed ends
      f. Fence

IX Hat

A. Knob
   1. Regular
   2. Tall
B. One peak
   1. Regular
   2. Tall
C. Two peaks
   1. Regular
   2. Tall
D. More than two peaks
   1. Regular
   2. Tall

E. Flat
   1. Regular
   2. Tall

X Double Outlines
   A. Square
   B. Irregular

XI Lump
   A. Smooth
   B. Blocky

XII Stomata
   A. Regular
   B. Sunburst

XIII Trichome (hair)
   A. Complete
      1. Triangular base
      2. Round base
   B. Base only
      1. Triangular base
      2. Round base
   C. Spine

XIV Bulliform Cells

XV Maple Key

XVI Rectangle and Square
   A. Smooth
      1. Opaque
      2. Clear
      3. Cross-hatched
   B. Projections

XVII Rods and Plates
   A. Projections
      1. Side projections
         a. Curved
         b. Thick triangular
         c. Thin triangular
         d. Thick rectangular
         e. Thin rectangular
         f. Thick mixed
         g. Thin mixed
      2. Ring projections
         a. Uniform
         b. Irregular
      3. Rounded projections
         a. Body

b. Side

4. Raised plates

B. No projections

1. Depressions
2. No depressions
    a. Straight edges
    b. Curved edges

XVIII Rondel

A. Plain

B. Ridge

1. Straight
    a. Circular
    b. Oval
        1) Long diameter
        2) Short diameter
2. Curved
    a. Circular
    b. Oval
        1) Long diameter
        2) Short diameter

C. Peak

XIX Saddle

A. Regular

B. Thick

XX Smooth Bump

XXI Spool

XXII Triangle

XXIII Variations

A. Cross

B. Dumbbell

1. Phalange
2. Rectangle

C. Irregular

Photo #1. A dumbbell (dumbbell - thin and concave - normal) from stub #25 (Sample #1527). Dumbbells come in many shapes and sizes, and are fairly distinctive. Several types of dumbbells may occur in one plant part, however.

Photo #2. A rod (rod - side projections - spines - blunt) from stub #25 (Sample #1527). This type of rod is fairly common in many plants, and therefore is not very diagnostic.


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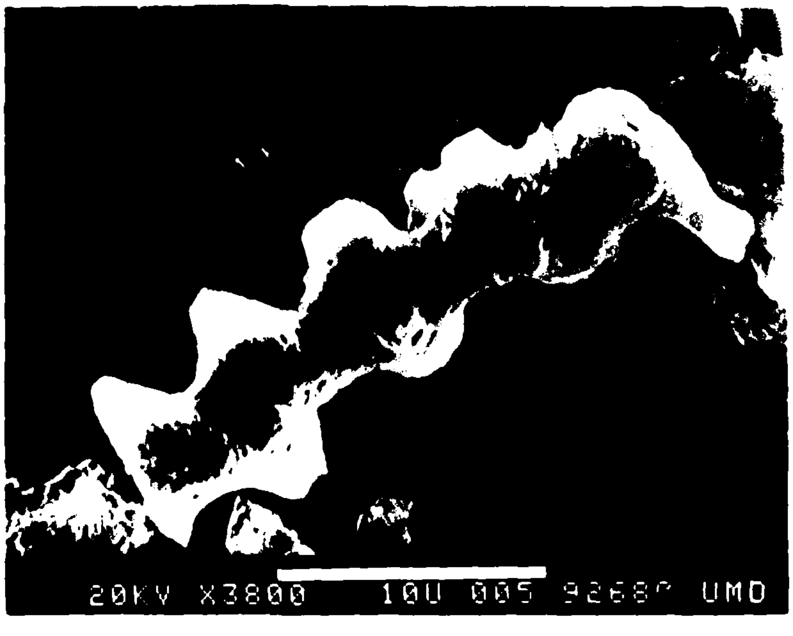
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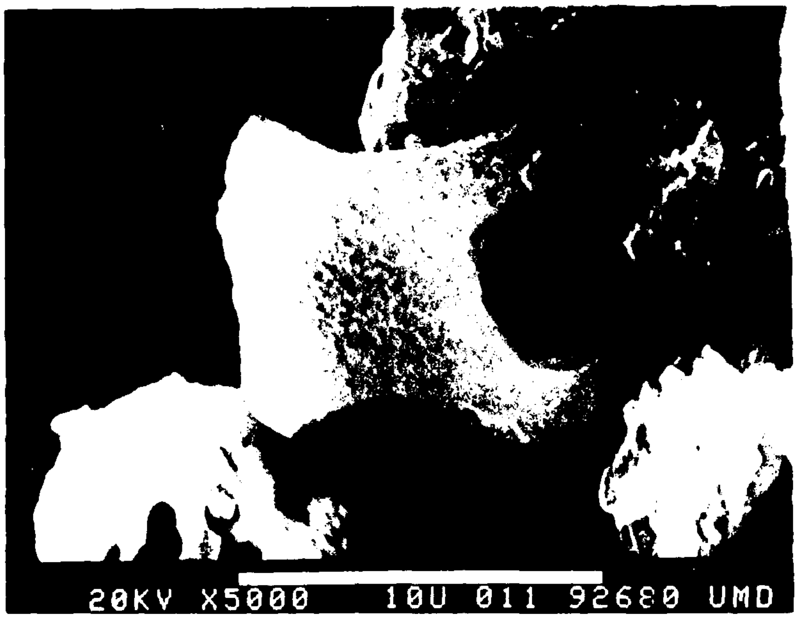
Photo #3. A saddle (saddle - thick) from stub #25 (Sample #1527). Saddles do not vary much in shape or size. However, they are not extremely common in plants. Therefore, although they may not be very distinctive, they may be somewhat diagnostic at the level of the subfamily within the grasses.

Photo #4. A dumbbell (dumbbell - thick and concave - rectangle) from stub #26 (Sample #1569).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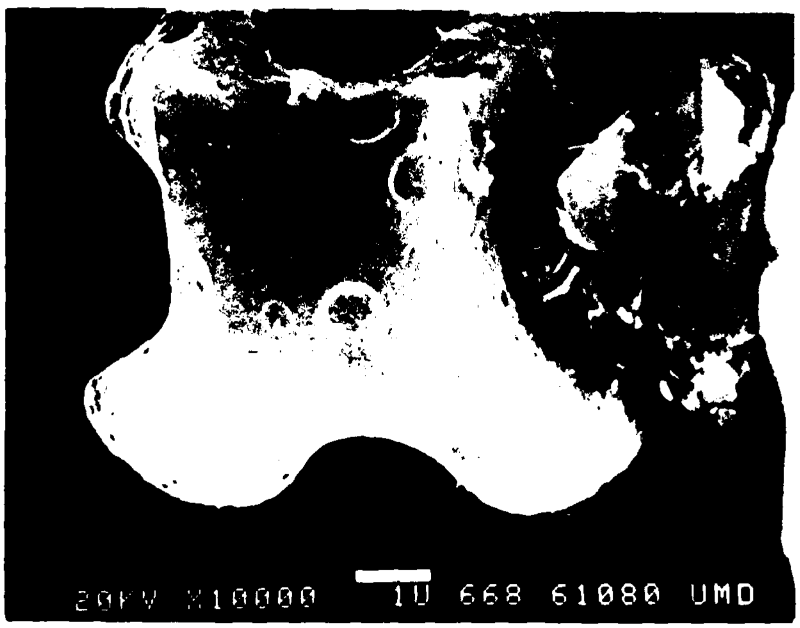
20KV X2000 10U 004 10380 UMD

Photo #5. Lump - hook - complete - round (possibly a silicified plant hair) from stub #26 (Sample #1569). These are small and therefore hard to examine for distinctive features with the light microscope. More work needs to be done using the SEM before we can determine how distinctive and/or diagnostic these shapes are.

Photo #6. A cross (cross - plateau - angled arms) from stub #32 (Sample #1975). This type of phytolith has not been seen in very many plants. Therefore, it is considered a fairly distinctive and diagnostic phytolith. It hard to distinguish from regular crosses with the light microscope.


20KV X2800 10U 665 60480 UMD


1U 668 61080 UMD

A COMPARATIVE GEOMORPHOLOGICAL STUDY OF 22IT539 & 22IT576

by

Fred Nials

University of Eastern New Mexico
Portales, New Mexico

SITE 22IT539

The topographic feature on which the site is located appears to have originated as a parallel bar deposit. This assessment is based on the morphology of the feature and character of the sediments. The exact position of the channel responsible for the formation of the mound was impossible to determine. Examination of aerial photographs and a brief fly-over resulted in the conclusion that the former channels have been destroyed or obscured by subsequent channel migration.

Examination of the site allows a basis for comparison with Site 22IT576. A synopsis of similarities and dissimilarities follows.

SIMILARITIES TO SITE 22IT576

1. The geologic sedimentary sequence appears to be similar. The site is underlain by a buried soil believed to be Late Pleistocene-Early Holocene in age.

2. The origin of the deposits appears to be a parallel bar depositional environment.

3. Both sites occupy topographic highs in the floodplain.

4. Occupation at both sites appears to have modified normal pedologic characteristics, including color, organic content, and soil structure.

DISSIMILARITIES TO SITE 22IT576

1. Site 22IT539 is larger. The reason for this is not known at present but probably is related to the geometry of meanders responsible for formation of the mounds and subsequent lateral erosion.

2. Sediments at Site 22IT539 are much sandier than those at 22IT576. This can be explained by variations in meander geometry, influx of coarse sediments from tributary streams nearby, and a somewhat steeper floodplain gradient (opposed to stream gradient) in the vicinity of Site 22IT539. The floodplain at this site is somewhat more constricted than at 22IT576.

3. The sandier parent materials result in solid and archaeologically modified deposits having a somewhat different appearance than in 22IT576. The sandier sediments allow much more

rapid infiltration movement of water through the sediments, and provide much less surface area per unit volume of sediment to entrap humic staining. Consequently, organically stained zones at 22IT539 would expectedly be thicker.

4. Deposition rates at 22IT539 were much more rapid than 22IT576. This is indicated by the greater total thickness of the deposit above the Late Pleistocene-Early Holocene buried soil and by the greater vertical separation of archaeological components.

5. Sediments at 22IT539 appear to be more quartzose, containing less glauconite and muscovite. This would produce fewer clay minerals as a by-product of weathering. Consequently soils at 22IT539 would expectedly have less pedogenic clays. Soils at 22IT539, therefore, are less cohesive and tend to have less well-developed soil structure.

6. Because of rapid deposition rates at 22IT539, frequency of artifacts per unit volume of sediment would expectedly be less than at 22IT576.

7. The presently known archaeological assemblages indicate occupation did not start as early at 22IT539. As of the present time there is no evidence to suggest a reason for this other than cultural selection.

8. There seems to be a much higher frequency of "burned clay" in the 22IT539 and 22IT576 site samples than in the surrounding (off-site) sediments. This would argue for these sediments (clays and/or silts) being imported into the sites, although the reason for the translocation of sediments is not understood fully at this time.

OSTEOLOGICAL REPORT AND RECOMMENDATIONS

FOR 22IT539 AND 22IT576

by

Robert I. Gilbert, Jr., PhD.

Memphis, Tennessee

December, 1980

INTRODUCTION

From the outset of Phase I excavations, is was presumed, based on testing information, that preservation of human skeletal remains would be marginal at best. Unfortunately, these expectations have proven to be more than correct. The skeletal material from 22IT539 and 22IT576 is in very poor condition. Much of the skeletal information was lost in the field due to the poor preservation. Presumably the poor bone preservation resulted from high acidity and a high degree of leaching and weathering of soil matrices. In addition to the pH of the soil, poor preservation environments may be the result of continued water infusion and/or submersion due to the location of the investigated sites in the river bottoms.

Many of the burials were little more than bone smears and streaks in the soil. The almost total lack of resistance and structural integrity of the bone resulted in several instances of the burials being discovered after disturbance by excavation. This situation was exacerbated, in many instances, by an absence of distinctive soil colorations indicative of the presence of a burial. Of the skeletal material examined, only one burial contained relatively intact bone. The bone in this burial, however, was severely weathered.

Considerable care was exercised, for the most part, in the removal, transportation and laboratory handling of osteological material. There is little evidence of fresh breakage resulting from rough treatment in the field or laboratory. Care has been taken to minimize attempts at cleaning or manipulation of the burials, for the eventuality that additional analysis might be undertaken.

Insofar as possible, skeletal remains should not be moved any more than necessary. The fragmentary nature and continued drying and cracking of the surrounding matrix is contributing to a considerable loss of information. The present state of the material makes age and sex assessments difficult, but further manipulation should be restricted until final analysis. Undoubtedly, more accurate observations are possible, but these should await thorough cleaning and stabilization. Proper cleaning and stabilization of the material will involve the expenditure of many man-hours and may not be cost effective in terms of the information obtained.

Portions of the bone sample may be preserved by the addition of various types of perfusion substances. However, it should be noted that many analysts resist the use of such substances because of possible interference with and complications in future chemical analyses of the osteological material. Perhaps some compromise may be reached before the final analyses of the Phase I sample.

Numerous bits and pieces of various dentitions are available for study, although not all of these have exact context associations. It is possible that an intensive analysis of dentition might yield additional figures on antemortem loss and sex.

The overall condition of the skeletal material does not offer promise for the application of trace element analyses, blood type tests, or other assorted sophisticated techniques. While the possibility of such analyses should not be overlooked, it is probable that they will prove inconclusive and expensive. Osteological analysis using standard anthropometric methods will most likely prove the best means of investigation.

The general condition, as well as the low number of burials recovered, will be an obvious impediment to the generation of population parameters. The skeletal material from 22IT576 is dispersed widely through time. This dispersal, combined with the small sample size, precludes any secure discussion of the population. Because of the presumed antiquity of the burials from 22IT539, it would seem imperative that these burials be given priority in analysis with the application of all possible techniques which may offer additional information.

This preliminary analysis of the burials provided for examination was based upon the use of standard anthropometric and visual techniques (Bass 1971). The burials were not cleaned or handled beyond the minimum required for sex and age observations. The fragile state of the material and the desirability of not disturbing material embedded in matrix until more adequate time and facilities were available restricted the present study to the summarization of easily obtained information. No obvious pathologies were noted, but the absence of pathologies in the preliminary examination may well be accounted for by the necessarily superficial nature of the analysis. The results of this preliminary analysis are presented below.

PRELIMINARY OSTEOLOGICAL ANALYSIS: 22IT539

BURIAL 4

This burial was jacketed in plaster for preservation. The only portion available for examination without breaking open the plaster was the upper and a small portion of the lower dental arcade. Based upon the condition of the teeth and their size, a tentative identification of a female aged approximately 30 years is made.

BURIAL 5

This burial also was jacketed in plaster. Tentative identification based upon visible dentition is that of a male approximately 40 years of age.

BURIAL 2

The skeletal material derived from this burial is in very poor condition. Further laboratory work might elicit additional information. These remains are those of an adult of unknown sex.

BURIAL 18

This feature represents portions of what appear to be a young human. Sex identification is not offered. This particular feature should probably be thoroughly worked in the laboratory as much of the osteological material is partially preserved.

BURIAL 7

Most of the osteological remains are absent. However, based upon the distal right humerus, Feature 150 appears to be an adult male.

BURIAL 19

This feature has several bone types present. Some of them are adult human, but many of the others are nonhuman mammal.

BURIAL 17

This feature consists of portions of a dental arcade embedded in a sandy clay matrix. The bone is poorly preserved, but a careful laboratory work-up might possibly provide addition information.

PRELIMINARY OSTEOLOGICAL ANALYSIS: 22IT576

BURIAL 3

Sufficient material for identification of this burial, beyond that of an adult, was not preserved.

BURIAL 5

The material in this burial is in relatively good condition in comparison to most of the skeletal remains from this site. Burial 5 is probably a female of elderly years (40+).

BURIAL 6

Most of this skeletal material is still embedded in the clay matrix, preventing a thorough examination. The remains appear to be those of an adult. Sufficient material for sexual identification was absent.

BURIAL 8

A partial portion of the cranium is preserved. The remainder of the bones are in relatively poor condition. This is probably a male, based upon a visible portion of the mastoid. The age is uncertain, but it is definitely adult.

BURIAL 10

This burial is very poorly preserved. It will require considerable laboratory work.

BURIAL 11

This burial consists predominantly of portions of long bones with distal and proximal ends damaged or missing. Portions of other bones are present, but in the present state of preservation and without intensive laboratory work-up, sex and age specification are tentative. It is presumably a young female, 30.5 years of age.

BURIAL 12

The skeletal material in this burial is in a very poor state of preservation. Most of the long bones and associated osteological material are badly eroded and embedded in clay. The cranium has been topped by a shovel and dentition is completely eroded or missing. Possibly an adult male.

BURIAL 16

This burial is also in relatively poor condition. However, this skeletal material has more of the original bone preserved than the others. It is presumably an adult male, based upon femoral size, pelvis, and condition of mandible. Sex identification is uncertain.

EVALUATION OF THE LITHIC ANALYTICAL SYSTEM OF THE UNIVERSITY OF WEST FLORIDA MIDDEN MOUND PROJECT

by

Michael B. Collins

University of Kentucky

June 1980

RE: Phase I Archaeological Investigations at Nine Sites in Itawamba and Monroe Counties, Mississippi, by the University of West Florida, Office of Archaeological Contracts (1980).

Dear Dr. Bense:

This is to report my evaluation of those aspects of the above referenced project which deal with lithics. On 27 May, I met with Judy Bense, Eugene Futato, Blaine Ensor, and Mike Rodeffer at the laboratory facility in Fulton. In those discussions I was familiarized with the geological setting of the project and the general region (with particular reference to sources of chippable stone). On 28 May, Bense, Ensor, and Futato conducted a tour for me to the two sites currently under excavation, as well as other localities along the waterway project. The day of 29 May was spent in the laboratory with Ensor and Futato who explained the procedures for cataloging and analyzing lithics. In the evening, a discussion of the lithic study was held with all project supervisors (plus Lloyd Chapman) assembled. During the morning of 30 May, Blaine Ensor, David Dye, and I reviewed in some depth those aspects of the lithic study which impinge on revising the current draft of the research design, on writing the interim report as well as on developing the research program for subsequent phases of the project. This latter was in many ways the most informative session during my visit. It is on the basis of these activities, as well as the written materials with which I was provided (principally laboratory coding forms, the list of lithic type categories, the lab manual draft, and the second draft of research design), that the following evaluation rests.

It was repeatedly stated by project staff that this is to be a "state-of-the-art" project. It is not. To make it so will require a number of changes - some of significant magnitude, most rather minor. That the lithics study aspects of the effort are not state-of-the-art quality does not in any way mean that they are inadequate; in fact, Ensor and Futato have a very high degree of understanding of archaeological lithic analysis and the basic system in use is sound.

In spite of its basic soundness, I identify three areas of concern as the system is being employed: (1) scheduling of aspects of the analysis, (2) nature of research issues being addressed, and (3) degree of refinement in the classification/analytical schemes. Before discussing these concerns individually, the criteria should be established on which I base my evaluation.

At this point in time, analysis of prehistoric lithics must consider three major aspects of artifact variation - stylistic, technological, and functional. All of these are included in the present system; each is of acceptable quality, but none is really

"state-of-the-art." Stylistic typology, used to identify temporal-spatial ("cultural") entities, is apparently the fullest developed and most effectively employed aspect of the present analysis. This is appropriate during the field phase of the project, as it is imperative that the excavators know where they are digging in cultural-temporal terms. Based on my limited acquaintance with the specific regional typologies, I see no deficiencies in their application. However, stylistic variation is susceptible to much more sophisticated analyses than the typological categorization of "implements." For example, stylistic attributes could be isolated, defined, and treated in multivariate studies. This departure from the regional norm should not replace the present typology but might be an attempt to go beyond it and contribute to (1) greater refinement of stylistically defined prehistoric assemblages and (2) better understanding of the nature of style as a variable in lithic morphology. The already stated objectives in the project Research Design definitely would be served by more detailed and rigorous stylistic controls. In short "state-of-the-art," to me, implies pushing beyond the present boundaries of inquiry. Going beyond established practices, however, is not without its risks. It is not advisable unless clear direction(s) and objectives are established and effective means for their attainment identified and proven out on test cases. Given the magnitude of the anticipated collections, any wasted motion - costing a few cents per artifact - would be disastrous. These issues are discussed more fully below.

Technological analysis is more demanding than typological because it treats all lithic specimens (including debitage), not just the "finished" ones with a stylistic basis for some of their variation. Also, the variables studied must be demonstrably technological; this means that ethnographic and experimental analogy must be invoked. Such analogs are often not readily available and should be developed experimentally using the same raw materials as are under study. The analytical procedures currently in use in Fulton are good but insufficient to fully extract the technological information residing in the collections. True "state-of-the-art" technological analysis includes processing the chipped lithics into several more categories using more technological variables and would be engaged in more replicative experimentation with the local chippable stones. More will be said below which relates to this topic.

Functional interpretation of lithic artifacts is presently the most rapidly developing part of the subfield. Techniques for reliably determining the origins of lithic use wear are being established by a number of scholars. These findings have just recently begun to be available, and much of what is available is already outmoded. These techniques are time-consuming, require specialized training, and employ expensive equipment. It is,

therefore, not surprising that this project is furthest from state-of-the-art status in this realm. Because of the costs involved in worthwhile functional analyses, two considerations are pertinent to this project - (1) a very small but meaningful sample of lithic artifacts must be drawn for this kind of analysis and (2) use of an established expert consultant might prove to be more efficient than attempting to do this study internally. The means of insuring selection of a meaningful sample is by far the major consideration at this time.

To return to the three concerns enumerated above, I would like to comment on each one individually as it relates to stylistic, technological, and functional interpretation.

Scheduling. A substantial proportion of the envisioned analysis in this project is being put off until "Phase III." From my experience, I personally would not approach scheduling a project of this magnitude in that way. However, for the present discussion, I am accepting as warranted whatever premises on which that decision has been based. There is one clear advantage and one emense danger in this scheduling strategy. The advantage is that, after everything is collected, a very precise sampling design can be developed which takes into account all relevant dimensions of the sampling universe and detailed study of that representative sample can produce legitimate results without the costs of analyzing more than is necessary. The sampling strata would each be defined in terms of context, form, material, and other variables. I would expect a few thousand sample strata to be generated in this approach. Also advantageous is that after Phase I (and II) all of the research objectives of Phase III - particularly those growing out of the fieldwork - will be fully known. The danger lies in the difficulties inherent in reliably establishing these sampling strata, the logistics of drawing the sample, and especially the potential for underestimating the effort required in the proposed analysis. For example, 8 projectile point/knives might be placed in 8 distinct sampling strata on the basis of their attribute states of style, technology, function, and context as follows:

			Context 1	2
function PP/K	Technology A (not heat treated)	Style R	*	*
		Style S	*	*
	Technology B (heat treated)	Style T	*	*
		Style S	*	*

for each cell, such additional attributes as use wear or edge angles might be the subject of further inquiry in "Phase III." The inefficiency of relocating and re-examining the individual specimens for Phase III analysis could exceed the savings anticipated from being able to sample within the collection (in this case 8

out of 8 specimens would be the "sample"). My greatest misgiving is that the sampling strata derived from the present analytical categories (see below) will not be sufficiently well defined, or "crisp."

Nature of research issues. The two categories of research issues which were made available to me are those which appear in the draft Research Design and those in David Dye's file which are to be addressed as part of the "Phase III" analysis. The latter are, for the most part, self-fulfilling in that they simply state in hypothesis format observations being made in the course of data recovery. One, for example, hypothsizes that "total lithic reduction" occurred at Site 22IT539. This derives from the relatively high proportion of cortical flakes, cores, and early stage rejects now being recovered from the site. Really advancing knowledge about the site would come from developing hypotheses about the adaptive significance (or whatever) of the reductive activities now being evidenced. Other aspects of the research design are on a higher level, but not well developed. For example, an hypothesis is that the midden mound site occupants participated in a trade network, which is followed by the single proposition, "If the hypothesis is true, then we would expect to find exotic materials in the midden mound site." Exotic materials were known from at least some of these sites on the basis of testing, therefore, the hypothsis was verified - according to this test implication - before it was formulated. More salient is the issue plaguing all of us who encounter exotic lithic materials, that is, "by which one or ones of the alternative means (spoils of war, plunder, trade, resource acquisition expeditions, seasonal rounds, bride wealth, etc.) were they introduced?" Trade is but one of many mechanisms whereby goods move about. Again, being "state-of-the-art" would demand establishing more sophisticated research issues and means for addressing them. Similarly, what meaning(s) can be attached to stylistic similarities over wide areas - is it the result of ideas or of people moving; is it movement of goods; is it not style but functionally-related form that we are measuring? Tough issues like these are missing from most of the research design material which I saw - to be state-of-the-art, and to have value outside of the southeast, fundamental issues must be addressed.

Degree of refinement in classification/analytical scheme. It would appear that no matter what research issues are finally addressed in Phase III, certain aspects of lithic sorting and data recording which are not now being done will be necessary. It would result in greater resolution of the variability in the entire lithic collection if such things as reworked objects and various pieces were identified and classified as such. Basic metric data are more efficiently captured during initial processing. So much basic data recording and analysis of this sort is being put off until Phase III that problems could be

substantial. I would suggest careful consideration of the alternatives suggested below.

In summary, the lithic analytical aspects of this project are sound but subject to significant improvement. The improvement might be achieved by either of the following two alternatives.

Alternative 1: Increase substantially the capture of lithic data in Phase I, including the already processed specimens, for the purposes of achieving finer resolution of lithic variability and more precisely identifying the research issues to be addressed in Phase III. The additional data would consist of such attributes as measurements, more technological categories, breakage patterns, etc. Basic attributes should be recorded for a sample of flakes from each provenience in order to detect patterns in debitage distributions. These changes would definitely be costly in terms of time (especially going back through already processed materials), but perhaps not inordinately when considered in light of the costs which might be incurred by doing much of this in Phase III.

Alternative 2: Remain with the present strategy, but with much more detailed plans developed for carrying out Phase III. At the moment Phase III is not very clearly developed and "gearing up" for it once it is designed is likely to be inefficient and costly. In other words, now is the time to begin detailed preparations for Phase III analysis if the decision is to maintain the present scheduling.

I hope that these comments will be of use to you; if you need amplification on any point, I will be happy to provide it. I enjoyed seeing this operation and was impressed by it - I wish you the best of success in your efforts.

Regards,
signed
M. B. Collins

MBC/vs

cc: Lloyd Chapman
Ernie Seckinger

MICROWEAR ANALYSIS AND EVALUATION OF THE CHIPPED STONE TOOL CLASSIFICATION SYSTEM FOR THE UNIVERSITY OF WEST FLORIDA ARCHAIC MIDDEN MOUND PROJECT

by

Stanley A. Ahler

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Grand Forks, North Dakota

January 1981

INTRODUCTION

The author spent the period from January 7 through January 15, 1981 at the University of West Florida (UWF) Field Headquarters in Fulton, Mississippi, serving as a consultant in microwear analysis of stone artifact collections from the excavation of Archaic midden mound sites in the Tennessee-Tombigbee Waterway. The purpose of the work was twofold: (1) to examine a representative sample of the stone tools from one or more of the midden mound sites using techniques of microwear examination in order to assess the range of technological and functional variability within the collections and the utility of the current artifact classification system for capturing that information; and (2) to provide recommendations for types of analysis and hypothesis testing which might be productively pursued in the final intensive analysis and interpretation phase of the Tenn-Tom project. Activities in Fulton included five and one-half days of intensive microscopic examination of the stone tool collections, one day of site visitation, and a day and a half of discussions with the UWF staff including an evening presentation on the techniques, methods, and results of the analysis.

THE CURRENT TOOL CLASSIFICATION SYSTEM

To make the results of the study meaningful, it is necessary to review the structure and organization of the chipped stone tool classification system currently in use on the UWF Project. To clarify this discussion, I must also introduce a series of terms which can be used to characterize the variability in the stone tool samples and which will be used to organize data on individual artifacts. It is possible to classify any given artifact in several different dimensions of variability, depending on which aspect of the prehistoric cultural system one wishes to focus upon (Ahler 1975:15-16). A tool can be classified according to its use or <u>function</u>, in technical terms, the nature of the actual or intended articulation between the tool and other elements or materials in the cultural system. Ideally, functional classifications specify the precise material being altered by the stone tool and the manner of alteration, but in actuality we often settle for functional classification based on the relative hardness of the work material (soft, medium, hard) and the relative motion between tool and work (scraping, sawing, slicing, chopping, etc). Detailed functional classifications, based on wear pattern examination and relevant to the current study, are available in a variety of sources (e.g., Tringham <u>et</u> <u>al</u>. 1974; Ranere 1975; Ahler 1971:88-117, 1975:141-149, 1977:71-92).

A tool can at the same time be classified according to its <u>technology</u>, or the associated set of flintknapping operations

that are applied to a tool to transform it from an unaltered piece of raw material to a finished, usable product. Several technological classes or trajectories have been identified in other studies of North American chipped stone tool collections (Ahler 1975:95-96) and most or all of these will be applicable to the technological variation in the UWF collections: small thin bifaces (pressure only); large thin bifaces (hard hammer, soft hammer, and pressure); irregular bifaces (hard hammer); patterned unifacial (percussion or pressure); unpatterned flake tools (percussion, pressure, or use flaking); thick bifaces (hard hammer); non-bipolar cores (hard hammer); and bipolar cores (hard or soft hammer).

Schiffer (1972), among others, has noted that each tool has a life history progressing from raw material selection through manufacture, use, and finally, discard. It is useful, and indeed necessary, to assess the location of an artifact in this life history trajectory (its systemic context) at the time it was deposited into the archaeological record so that we can accurately separate manufacturing data from tool use data in the analysis process. The concept of use-phase class is used to provide control over the systemic context of the tools, with each tool categorized according to four potential use-phase classes (Ahler 1975:148):

1. Unbroken, unfinished tools subject to further modification before becoming useful, functional items.

2. Tools and tool fragments broken or rejected during the manufacturing process.

3. Unbroken, unexhausted tools, technologically finished and capable of serving their intended purpose or function.

4. Tools and tool fragments broken or rejected after manufacture was completed and after the use process was begun.

Finally, tools can be classified according to their morphology, or general considerations of size, shape, and macromorphological appearance. The morphological classes might be used to characterize the degree of modification and patterning applied to a particular tool (for example, the various subclasses of retouched flake tools), they might reflect functional variation linked to the shape of the tool, or, if function is well controlled, morphological variation might in fact reflect stylistic variability, or change in artifact form imparted to a tool due to differences in social context of manufacture.

I think it can easily be seen that to study a stone tool assemblage from the perspective of information on human behavior, we must deal with all or nearly all of these dimensions of variability simultaneously. For example, to study the maintenance and extractive tasks performed at a site we must have control over use-phase variation so that we limit our investigations to artifacts actually completely manufactured; similarly, to study the spatial patterning of human behavior related to the tool manufacture-use-discard trajectory, we need to control the technology and examine variability in use-phase class frequencies, perhaps irrespective of artifact function. Because of the need to independently control the dimensions of artifact variability during analysis, the stone tool classification system used in a project should explicitly deal with each of these dimensions of variation.

The chipped stone tool classification procedure used on the UWF Project consists of the seven major groups or "morphological types" listed below:

01 Projectile Point/Knives (PP/Ks)
02 Biface Blades
03 Preforms
04 Cores
05 Scrapers
06 Drills, Perforators, etc.
07 Other Uniface and Biface Tools

Each of these seven major groupings is further subdivided into a large number of "categories" designed to provide more detailed data on artifacts placed within each major group. The theme or dimension(s) of variability accounted for by the categories varies from one major group to another.

It is useful to discuss the classification system in terms of the dimensions identified above (function, technology, use-phase, and morphology). Once the system is understood in those terms, it will be relatively simple to assess the accuracy and utility of the system when wear pattern data are taken into account.

The first three of the seven major groupings are intended to include artifacts belonging to a single functional class (projectile point/knife) and a single technological class (large, thin bifaces), but differing from each other in use-phase class or subclasses. For example, all items in the preform and biface blade groups should be unfinished, use-phase 1 or 2 PP/Ks, entering the archaeological record during the manufacturing process. Preforms are less far along the manufacturing trajectory than are biface blades. Categories of preforms capture further distinctions in degree of technological completion and whether an artifact originates on a flake or cobble blank. Categories of biface

blades take into account (although not consistently) variation in morphology, fragmentation, and whether on a flake or cobble blank. The morphological type projectile point/knife (PP/K) includes only large thin bifacial tools in use-phase 3 or 4, that is, technologically finished, functional items or items discarded after use. The name PP/K implies potential functional variability within the class; categories within the class do not deal with functional variability, but rather deal almost exclusively with morphology (traditional projectile point types) with minor attention given to identification of untypeable fragments. No distinction is made between use-phase 3 and 4 specimens in the PP/K category system (or anywhere in the UWF system).

The core group apparently includes both core-like objects that might be the initial stage of manufacture of large thin bifacial tools as well as true cores and fragments of cores that functioned as sources of flakes for use or manufacture of other tools. Categories of cores distinguish the technology (bipolar, blade, microblade, and other) and the degree of modification on cores of other technology.

The scraper group includes most flake tools with intentional unifacial or bifacial marginal retouch as well as bifacial tools which have unifacially modified, beveled margins judged to be useful as scrapers. Categories of scrapers make distinctions among the technologies of manufacture (bifacial, unifacial), the shape of the edge (spokeshave vs. other), the (for some tools) shape of the flake on which other flaking occurs, and whether or not a tool is recycled on an earlier form. Utilized flakes or flake tools with very diminutive modification are not considered in the scraper group but rather are included as a category of debitage. No distinction among use-phases is made within the scraper group.

The group drills, perforators, etc. includes bifacial and unifacial tools with narrow, pointed bits or working ends as well as denticulates and microliths. Categories relate morphological, technological, and assumed functional distinctions (drills or patterned bifacial technology, perforators and gravers of flake technology, etc.) Bifacial drills are further subdivided on the basis of morphology and completeness.

The final class, other uniface and biface tools, is a catchall group which includes virtually everything not included in the above groups. Many of the artifacts included here are of heavier bifacial or core tool technology, although flake tools and bipolar tools are included here as well. Categories are intended to be functional distinctions based on overall tool morphology and technology.

Table 1 provides a summary of information on the structure of the current chipped stone tool classification system used on the UWF Project. Of the seven major groups or morphological types, only the first three have any intended usefulness for controlling and categorizing one or more of the dimensions of variability discussed above. That is, the first three types are each intended to be functionally and technologically homogeneous and homogeneous with respect to whether tools are completely or incompletely manufactured. The remaining four tool types are each a mixture of several dimensions of variability; none of these is functionally, technologically, systemic-contextually, or morphologically distinctive. The core group is functionally the most restricted of these four groups, but the final three groups have no analytical consistency and might as well be ignored in any artifact analysis. The category subdivisions of the last four groups reflect a mixed and inconsistent capture of functional, technological, use-phase, and morphological variability. Taken individually, the categories provide a better basis for analysis than do any of the major groups they are contained within.

THE ARTIFACT SAMPLE AND EXAMINATION PROCEDURES

Large artifact samples were chosen for microwear examination from two sites which had been subjected to extensive excavations. Several specific questions posed by the senior staff were used to guide the sample selection. The staff had noted very obvious differences between Early Archaic and Late Archaic (Benton) components in terms of their respective bifacial reduction sequences and use of local versus non-local raw materials. Thus, the sample was selected to facilitate the examination of bifacial materials from both of these time periods. A second question of considerable concern was the actual function of artifacts classified as projectile point/knives. It was recognized that several of these tools probably served non-projectile purposes, but the question of specific correlations between form (type) and function remained to be explored.

Thus the sample was selected to contain both Early Archaic and Benton component materials, and at the same time to contain several PP/Ks from both time periods. In addition, the underlying question of the utility and accuracy of the UWF classification scheme was approached by selecting tools from all seven morphological types. Table 2 provides a summary of artifacts examined from each site according to their morphological type classification. The sample from 22IT576 was drawn entirely from Early Archaic Levels 13 and 15; from those levels, all artifacts were examined with the exception of unplotted, general level specimens. This sample included a small number of Kirk, Big

Sandy, and Greenbrier projectile points. The sample of tools from 22IT539 was chosen to provide a contrast with the Early Archaic materials from 22IT576 and secondarily to provide large samples of artifacts generally occurring in low frequencies in the 22IT576 sample (e.r., cores and drills). The PP/Ks from 22IT539 (mostly Bentons and a few related types) were drawn almost entirely from Levels 6 and 7 in Block B. Because other tool types were relatively scarce in that block and those levels, all the other tool forms except cores were selected from Levels 6, 7, and 8 in Block C, also Benton in age. The cores were a grab sample selected without regard to provenience from the full series from the site.

In summary, the sample represents a nonrandom, but probably representative, sample of all tool forms occurring in both Early Archaic and Late Archaic (Benton) contexts, with only a small and insignificant number of Middle Archaic forms being included from 22IT539.

The equipment used in the microwear analysis consisted of an American Optical stereoscopic, binocular microscope with zoom magnification ranging from 10X to 45X. Illumination was by reflected light using an Olympus TF high intensity illuminator. The general procedure was to first examine each artifact without magnification to gain an idea of general morphology and technology, then to examine it on a low power (10X) to provide an initial orientation and assessment of microwear, and finally, to examine it at high magnification (45X) to provide further details on microwear not observable at lower magnifications. If necessary for purposes of measuring wear intensity, the artifact would be examined again at increasingly lower magnifications. Notes were recorded on microwear details and other observations for each specimen, keyed to artifact number and a rough outline drawing, amd summary observations on the artifact's likely functional, technological, and use-phase classification, as per the above discussion, were recorded. A total of 322 stone tools were examined in this fashion in the work time of about five and one-half days, or at an average rate of about 60 artifacts per day. Patterned bifacial tools (PP/Ks etc.) required considerably more time for examination than did unpatterned tools (retouched flakes, cores, etc.) due to their often complex wear patterns in combination with complex morphologies and life histories.

RESULTS

Tables 3 and 4 present summaries, organized by site and by major tool morphological types, of the results of the intensive microscopic analysis of the tool sample. In each table, data are provided for each individual artifact, giving the original clas-

sification by morphological type and category, and giving the author's assessment of the most appropriate functional interpretation and technological and use-phase classification for each tool. Comments are provided concerning a few of the more prominent wear details or other attributes of the artifact. Space limitations prohibited inclusion of much additional wear data for most of the specimens. Where an artifact is recognized as having been recycled from one technological track or function to a second function or technology, multiple functional/technological classifications are provided on two lines for that particular specimen. Asterisks are used in the tables to note instances where the functional, technological, or use-phase classification provided by this author is in contradiction to or is inconsistent with the original type/category classification provided by the UWF system.

DISCUSSION - FUNCTIONAL VARIABILITY

The sample of Early Archaic PP/Ks is far too small to provide definitive statements concerning the function of these tool forms, with only eight Kirks, two Big Sandys and one Greenbrier examined in the sample. Even so, some statements can be made concerning the relationship of form and function in these types. Given the apparent contemporaniety of these types in the 22IT576 deposits, it can be hypothesized that these types are functionally distinct rather than socially (stylistically) distinct, thereby providing a more economical explanation for multiple artifact forms found in direct association in numerous archaeological sites and contexts. Using the results of the Rodgers Shelter projectile point analysis as a model (Ahler 1971), we might hypothesize more specifically that the Kirk corner-notched forms are specialized cutting tools seeing little or no use as true projectiles, and that the side-notched Big Sandy forms are in fact true projectiles. The limited sample provides little evidence contradictory to this hypothesis, but by no means provides a full test of the proposition. The Kirk forms show a great deal of attention devoted to lateral resharpening of the blade margins, with apparent concern for maintaining a very sharp, slightly serratted margin of low edge angle. This resharpening, in fact, obliterates possible lateral edge wear in many cases and makes functional statements less certain. Two of the seven Kirks do exhibit relatively intense, laterally concentrated wear almost certainly indicative of cutting tool use on soft animal or plant materials. Only one specimen (5645-1) has distally concentrated blade wear as would be expected in projectile use, and this specimen also shows clear use as a cutting tool. This distal wear could in fact derive from piercing use as a hand-held knife, rather than true projectile use. None of the Kirks exhibit im-

pact fractures, the single damage pattern thought to be most clearly indicative of projectile point usage.

The two Big Sandys present microwear and technological data somewhat contrastive to that of the Kirks. Neither specimen exhibits resharpening or particular attention to maintenance of sharp lateral blade margins. One specimen appears to be impact fractured, although most of this fracture scar is obliterated by subsequent recycling and use as a bipolar tool. Of note is that both specimens exhibit multiple burin-like flake removals from basal corners or corners of the blade, indicating that each tool endured considerable rotational stress while in the haft. Such fractures might occur upon impact, and such fractures are lacking in the Kirk sample.

In sum the resharpening and limited wear data for the Kirk sample is consistent with the hypothesis that these are specialized cutting tools used on soft materials, and the contrastive impact fracture data and lack of resharpening for Big Sandy tools is consistent with the hypothesis that these specimens served primarily as tips for projectiles.

The data in Table 4 provide a more firm functional interpretation of Benton points than was available for the much smaller sample of Early Archaic point forms. The sample includes 22 specimens indentified as Bentons; the 14 proximal, medial and distal fragments are also mostly fragments of Bentons judging by similarities in raw material and technology. Ten (45%) of the classified Bentons show clear evidence of being cutting tools used most often on soft materials as indicated by edge smoothing, rounding and occasionally striations, with wear concentrated on the medial part of lateral blade margins and fading to the interior of the blade. Eight Benton specimens (36%) exhibit a contrastive wear type consisting of edge and surface smoothing and rounding concentrated at the extreme distal end of the blade tip and fading proximally. Since only nine of the Bentons were distally intact, this wear pattern occurs on 89% of the observable specimens. This distally concentrated wear is highly similar to that produced experimentally for projectile points repeatedly imbedded in the ground (Ahler 1972:85-87). Of note is the fact that four of the 14 Bentons having interpretable wear patterns exhibit both the laterally concentrated wear indicative of cutting tool use and the distally concentrated wear indicative of potential projectile use, clearly suggesting that the Benton form is multifunctional rather than specialized in terms of intended use. Nearly all of the Benton specimens exhibit resharpening evidence in the form of bifacial (double) beveling; this form of resharpening seems more oriented toward reshaping the distal tip to a sharp point rather than toward maintaining a delicate and sharp lateral margin; this pattern contrasts strongly with the resharpening patterns seen on the Kirks.

Thus, wear data strongly indicate that Bentons served multiple purposes of cutting and projection, with dual functions often evident in single specimens. An interesting question arises, however, when fracture patterns are examined for confirmation of use as true projectiles. An additional sample of 83 Bentons from 22IT539 was observed for fracture types. Altogether, about 75% of the Bentons exhibit fractures. Of these, only about 4% (3 of 80 fractured specimens) exhibit classic impact fractures characterized by distal shatter and large, flute-like flakes directed from the tip along the longitudinal tool axis. Many specimens exhibit flat transverse fractures (25%) or, more often yet, hinged or lipped fracture surfaces (50% of fractured specimens). More than 20% of the fractured specimens are thermally broken. What is unclear here is the origin of the hinge/lip fractures (noted as impact ? in Table 4). These could, in fact, be a form of impact breakage occurring on long slender projectiles, or they could be simple bending fractures occurring on cutting, piercing, or prying tools. Experimental evidence is the most appropriate answer to this question; if experimentation shows the hinge/lip fracture not to be highly related to projectile usage, then the interpretation of the distal smoothing wear on the Benton specimens must also be re-evaluated as possibly derived from piercing and penetration tasks not linked with projection. In other words, the possibility remains open that the Bentons received use as hafted knives serving a variety of piercing, prying, and cutting tasks, but that they rarely served as projectiles. If this interpretation is confirmed, then the question of whether true projectiles occur at all in the Benton assemblages must be explored.

DISCUSSION - UTILITY AND ACCURACY OF THE SYSTEM

Attention here focuses on the six remaining morphological types or major artifact groups as well as the individual categorizations within each group. In particular, we will focus on the asterisked specimens in the Tables 3 and 4 which indicate inconsistency between the original classification and classification based on more intensive attention to tool technology and wear patterns. These inconsistencies are described and discussed specifically to enhance future studies using this material. The system employed was adequate for the establishment of a reliable data base.

Biface blades and preforms can be discussed together since both of these morphological types have in common an intended function as PP/Ks, a large thin bifacial technology, and use-phase 1 or 2 classification as unfinished specimens. Table 3 indicates that 17 of 41 tools (41%) are actually specimens that are technologically finished and have been or are usable for various tasks,

i.e., that they are in fact use-phase 3 or 4 specimens rather than specimens not yet functional. Much of this inconsistency in use-phase designation is clearly evident in wear pattern data clearly indicating actual use as cutting tools, scrapers, and adzes. In all, about 36% of the tools were functionally classified as something other than PP/Ks. Much technological variation was recognized, as well, including irregular bifaces, bifaces too thick to have yielded PP/Ks, tools of core technology, and two fragments of unmodified flaking debris.

Table 4 presents a similar picture of problems in use-phase classification, with 23 of 50 tools (46%) determined to be in use-phase 3 or 4 based on microwear and other technological evidence. A similar range of functional variability is present here, varying from finished usable cutting tools to scrapers, adzes, and expedient bifacial tools, choppers, and chisels; more than 20% of the biface blades and preforms from 22IT539 are functionally misclassified. Considerable technological variation is also detected here, with many specimens interpreted to be too small and thick to have ever been intended for production of PP/Ks, but rather, associated with an unpatterned expedient bifacial percussion technological procedure.

Seven "quarry blades" of Fort Payne chert were specifically examined to determine if they are in fact unused PP/K preforms or were perhaps used specimens. Five tools found in one feature exhibit extremely consistent facial and edge wear interpreted to be a combination of bag or transport wear and intentional dulling. Another pair of quarry blades found in a separate feature exhibit little use wear and evidence of having been further modified toward production of Benton points after having reached the site. In sum, none of the quarry blades appear to have been used as functional tools; all appear to be preforms for Benton points, and it appears that some further thinning and shaping of such specimens is occurring on-site.

A few comments are in order concerning the bifacial reduction processes apparent in the Benton and Early Archaic samples. The processes do indeed contrast strongly between the two time periods. Evidence of controlled thinning of bifacial preforms is generally very easy to detect in the collections as a whole; intentional edge grinding was consistently used in conjunction with thinning with soft hammer percussion. Thus, there is little difficulty in recognizing bifacial preform material wherever it occurs in the collections. Such material is extremely common in the Early Archaic sample, but, in contrast, is nearly absent in the Benton sample. All stages of biface reduction, except perhaps the initial edging of flake or cobble blanks, are present in some abundance in the early collections. It appears that one of the major on-site activities during the Early Archaic was production of bifacial preforms and finished bifacial tools using

locally available, heat-treated raw materials. In contrast, there is very little evidence of such activities in the Benton sample. Nearly all of the Benton bifacial work is based on imported Fort Payne chert which enters the site in the semi-finished "quarry blade" form; almost no work in bifacial reduction of local raw materials occurs on site. That which does occur in the Benton sample appears to be of technical quality distinctly inferior to the bifacial thinning technology used in both the Early Archaic work with local sources and in the imported quarry blade artifacts.

Turning to the morphological type cores, considerable inconsistency is noted in the functional and technological interpretation of these specimens. Of six specimens classified technologically as microblade cores, five are judged by this author not to have been used for production of microblades, blades, or even blade-like flakes. Many of these are simply very small in size, but "micro" size is not equatable with a "microblade" technology. An interesting variant of cores was noted in the collection and it is probably worthy of additional study. These are the specimens termed "marble cores" in functional classification; this term is based on their very small size, near-spherical shape in many cases, and apparent reduction beyond the point of useful flake production. Most marble cores are modified by freehand percussion, but at least one specimen of the same morphology exhibited both freehand and bipolar percussion scars.

By far the most serious problem in core classification is the large number of non-core, functional tools included in this class. Of the 72 cores examined, 26 or 36% were determined to be tools of some sort rather than simply sources of flakes and raw material. Most common functional occurrences include chopping tools and small expedient tools made by a hard hammer technology appied to the edge of a small chunk or thick flake. In addition, four specimens were judged to be flaking debris, and one specimen is an unaltered natural cobble.

It is very difficult to provide summary statements for the morphological type scrapers. In general, the class name "scraper" is a functional misnomer since only a small fraction of the tools within the class actually exhibit evidence of true scraping use. By far the majority of the tools are in fact relatively unworn, indicating use as expedient tools serving a variety of cutting, slicing, sawing, and scraping tasks on various raw materials. In the sense, however, that the term "scraper" is a morphological/technological distinction rather than a functional one, then the inclusion of materials within this class is relatively consistent. Even so, there is considerable detectable functional variability within the class which has gone uncaptured by the current system of categorization which focuses heavily on morphological variability and flake form. Microwear shows that

several artifacts have, in fact, functioned as true scraping tools, and furthermore, that many of these were probably hafted during use and were intensively used on materials such as hides. This is an important functional detail which should be accounted for by the system, but which is currently lost in the plethora of morphological categories.

The morphological type drill, perforator, etc., exhibits a fairly accurate correlation between function as reflected in categories and function as determined from microwear examination. The sample, however, was restricted almost entirely to categories of drills, per se, so there was practically no evaluation of the other functional categories within this group (reamer, perforator, graver, microlith, etc.). Nearly all drills examined appeared to be drills; where wear was sufficiently intense for specific functional interpretation, a rotational motion was almost always indicated, with little clear evidence of use as awls, punches, etc. Evidence of drill use against both hard materials (bone, stone) and soft materials (probably wood) was apparent. It is probable that nearly all of these specimens were hafted during use.

The final morphological type, other uniface and biface tools, presented some of the most serious and pervasive inconsistencies between original classification and classification based on attention to technology and microwear data. The most serious problem occurs within the category unidentifiable chipped stone fragment. These materials are in fact unidentifiable only in a stylistic or typological sense; in nearly all instances it is entirely possible to provide accurate functional, technological, and use-phase designations for these tools. Twenty of the 40 tools in this morphological type were placed within the category unidentifiable chipped stone fragment, and of these 20, all but two were given confident functional, technological, and use-phase classifications. A wide range of tool functions and technologies are represented here, varying from unfinished bifacial preform fragments to pieces of scrapers, bipolar implements, and cores. The other categories within this morphological type are intended to be primarily functional in content, and of the 20 artifacts assigned to these categories, 5 or 25% have functional interpretations inconsistent with their original classifications. In summary, a great deal of behavioral information is available within this morphological type, and much of it is unaccounted for due to an overemphasis on the morphological variability to the relative exclusion of data on function, technology, and use-phase.

Table 5 provides a summary of the frequency of inconsistencies between the original type/category classification and the functional, technological, and use-phase classifications based on a more intensive macroscopic and microscopic study of the stone

tool sample. Percentages in the table indicate the proportion of stone tools for which inconsistencies occur in each dimension of variability and for each major morphological type. For some dimensions, such percentages or statements on inconsistency are not applicable, since no control of that particular dimension was ever intended in the original morphological type system. Such instances are noted as NA, not applicable. There are several instances where a tool has been recycled to serve multiple functions in the prehistoric system. Either the primary or secondary function and/or technology was not captured by the classification system, and these instances are included as inconsistencies in Table 5. Finally, it can be noted that the current system does not deal systematically with fracture and the important distinction between use-phase 1 and 2 or the distinction between use-phase 3 and 4; this limitation is not reflected in Table 5 but should be noted as occurring throughout all morphological types.

OBSERVATIONS ON DEBITAGE

A sample of more than 700 pieces of "debitage" (ID No. 4483) of 1/4" and 1/2" size from a single excavation unit in an Early Archaic horizon at 22IT576 was briefly examined. Since these materials represent only one sample from a single part of one site, probably sorted and classified by a single lab worker, observations on these materials may not be generally applicable to debitage from the UWF Project in general. Neverthless, certain observations may be of some significance.

Nearly all of the material examined was classified as nonutilized, unmodified flaking debris. I was particularly interested in the cleanness of this material in terms of removal of small tool fragments, modified pieces, etc. Three artifacts that I would classify as small bifacial edge fragments were found, two in ID 4483, Cat. Nos. 7-58, and one in ID 4483, Cat. Nos. 110-665. This represents to me a relatively clean sort of such materials and good separation of tools from flaking debris. I should note that chunky shaped pieces of flaking debris (shatter, etc.) were not included in the "debitage" class, and none of these materials were examined by the author.

A few observations on heat treatment can be noted. The material identified as Unheated Yellow chert (e.g., ID 4483, Cat. Nos. 75-109) appears to be simply an unheated version of the deep red chert classified as Heated Camden chert. Also, in ID 4483, Cat. Nos. 656-725, material that was classified as Unheated Camden chert, about half of the flakes have a definite pinkish color, almost certainly indicative of heat alteration.

Nine utilized flakes were examined as part of the ID 4483 debitage sample. I would agree with classification of three of these as tools or tool fragments; the remaining six appear to be unmodified or accidentally altered, non-tool flakes and flake fragments.

Technologically, the material in this sample appears to be relatively homogeneous, with practically all of the debris reflecting derivation from various stages of well-controlled bifacial thinning. A great number of the flakes exhibit the classic form of bifacial thinning debris, and many have platforms prepared by intentional grinding. The nature of the debris is entirely consistent with heavy use of local, heat-treated raw material for production of well-thinned bifacial tools, as clearly reflected in the stone tool aggregate from lower levels of this site.

SUMMARY AND RECOMMENDATIONS

Several significant shortcomings are apparent in the existing UWF system of chipped stone tool classification, and most of these will severely limit the utility of the current scheme for analysis of variability in prehistoric human behavior at the sites examined in the UWF Project. Some of these shortcomings result from the logic or lack of logic in the structure in the system; others are more directly a result of the macromorphological artifact examination and classification schemes which must be used in the initial stages of any project of similar scope and time schedule. The most important shortcomings are as follows:

1. The system does not explicitly recognize the importance of multiple dimensions of variability in the stone tool record nor the need to independently control variability in all or most of these dimensions in the analysis process. Far too much emphasis has been placed on documenting variation in the morphological (stylistic) dimension, and far too little emphasis has been placed on the behaviorally more important dimensions or technology, function, and systemic context. This problem is generaly the result of the historic origins of the UWF classification system and is by no means unique to the UWF Project.

2. Explication of the tool reduction sequence leading to the production of usable projectile points and hafted cutting tools is emphasized in the system, but a large number of usable and used stone tools are incorrectly classified as being unfinished tools (blanks, preforms) within this sequence. This is in part a result of the macromorphological artifact analysis which does not incorporate use-wear data, and it is in part a result of the fact that the system does not provide

a logical place for usable, technologically finished, unhafted bifacial implements. Most such tools are forced into the biface blade type which logically should not contain them.

3. Tool technologies other than large, thin bifacial tools are not explicitly recognized in the collections, nor is there recognition that many of these tools also potentially have an interpretable life history just as the patterned bifacial implements do.

4. Many functional classifications of cores, retouched flake tools, and other unifacial and bifacial tool forms are macromorphologically logical, but are found to be incorrect when microwear data are taken into account.

5. Fractured tools of all types are given inadequate treatment. Important information contained in small tool fragments is ignored because they are not stylistically classifiable. Fractures and fragmentation data are ignored or inconsistently recorded for nearly all of the collection. As a result, much information on artifact discard and disposal patterns has been ignored, as have important data on the circumstances and causes of fracture.

6. Recycled and multipurpose implements are inconsistently treated in the analysis, thereby ignoring at least half of the significant behavioral data contained within such specimens.

7. As has long been suspected, a great deal of specific functional variability has so far gone undetected in the category PP/Ks. Such variability is important for the interpretation of the regional prehistory, but it cannot be explicated without use of micro-analytical techniques.

On the other hand, several positive points can be made concerning the overall laboratory process and artifact classification system employed in the UWF Project:

1. The system does provide relatively consistent and detailed information on stylistic variability in the patterned bifacial tools, particularly for projectile points and hafted cutting tools. Regardless of the functional interpretation of these materials, these data will undoubtedly prove adequate for providing accurate culture-historical assessments of the sites and components and will help lay the organizational groundwork for much of the detailed analytical effort to follow in Phase III.

2. The raw material/heat-treatment classification system seems well-organized, accurate, and consistently applied.

3. The overall procedures for artifact processing and classification are being applied in an efficient and consistent manner, with good quality control being maintained (within the inherent limitations of the classification system as a whole). The identification and separation of tools from unmodified flaking debris is being accurately done; size grade, raw material, and heat treatment data for flaking debris appears to be consistently recorded, and these data should prove adequate for pursuit of many questions concerning resource utilization and lithic technology.

4. The above three points, taken together, mean that a large and relatively reliable data base is being built in the course of Phase I and Phase II programs. While the data base will not prove adequate for testing sophisticated propositions concerning prehistoric human behavior, it should be entirely sufficient for accurately and efficiently planning such studies, which by their very nature and intensity, must logically take place during Phase III of the project. For example, an accurate inventory of projectile point types, stone tool classes organized by gross technological subdivisions, and flaking debris occurrence now exists in conjunction with precise control over the archaeological context of such specimens; these data will provide the basis for future sampling schemes and efficient cost estimates for future analytical efforts.

A series of specific recommendations are provided concerning methods and analytical procedures to be incorporated within future studies of chipped stone materials from the UWF Project. Time and the need for maintaining consistency preclude the implementation of these recommendations during Phase I or Phase II of the project; all recommendations are intended for incorporation in Phase III activities:

1. . full-time lithic specialist should be maintained on the ɾ oject staff for most or all of the duration of Phase III. The person should provide input into the experimental flintknapping and tool use programs, and should have direct responsibility for intensive reexamination of most of the stone tool collection to be incorporated in Phase III studies. In the interest of consistency and quality control, the latter responsibilities should not be delegated to multiple staff members with diverse experience.

2. An experimental program should be conducted which focuses on replication of possible and probably biface reduction sequences in Fort Payne and Camden chert; the program should

also include other modes of tool production and core reduction. Experimental work should include heat treatment and it should also concentrate on controlled generation of experimental flaking debris for use as a data base in the interpretation of mass analysis and attribute data in the archaeological debris samples. Another facet of the program should be the experimental production of patterned bifacial tools resembling PP/Ks and a program of intentional fracture of such tools to assist in the interpretation of archaeologically observed fracture patterns. An experienced flint knapper with better than average skills should conduct the tool production experiments.

3. The project lithic specialist should intensively reexamine and reclassify all stone tools that are to form part of the data base for the Phase III analysis and interpretation program. It is assumed that this sample will include all tools from one or more major excavation blocks from several sites. Information from the current study suggests that the only existing morphological type which might require less intensive reanalysis would be drills/perforators; all other types should be reexamined individually with the discussions in previous sections of this report in mind. Artifact reexamination should include intensive microscopic study and systematic recording of microwear data for samples of several tool classes, using recording procedures patterned after Ahler (1979:317-318) or Odell (1979). The tool reexamination should result in data recorded on most or all of the following qualitative variables for each artifact: functional class, technological class, use-phase class, morphological class, haft mode, fracture type, fracture location, resharpening mode, recycling, multifunctionality, raw material, heat treatment, pre/post heat flaking, thermal fracture, and cortex occurrence.

4. Given the ubiquity of PP/Ks in the archaeological record, the tool reexamination should give special attention to their functional interpretation. Hypotheses discussed above concerning the relationship between PP/K form and function should be tested; this work can clearly focus on Early Archaic and Late Archaic (Benton) materials, since the tentative results presented here suggest contrastive tool use patterns during the two time periods. Middle Archaic materials could be included if time and sample sizes permit. Experimental (fracture pattern) data should play an important role in such studies, as should microwear data. If necessary, the sample of Early Archaic PP/Ks could be expanded using typologically similar, locally available collections (for example, from the Hester site, Brookes 1979).

5. Debitage analysis should be based on a combined use of mass analysis data and individual flake attribute data, all assessed with reference to an experimentally generated data base for the same variables. The existing data on size grade distributions, raw materials, and heat treatment should prove adequate for use in the flaking debris analysis. Attribute information, not presently recorded for the collections, should probably be taken from limited samples of debris. Fine-screened control block samples are likely sources of flakes for attribute studies; the attribute study should include observations on frequency of cortex, a technologically sensitive variable. Samples of grade 4 (0.125 inch mesh) flaking debris should also be included for information on pressure flaking and other small tool modifications; debris from such operations is almost entirely lacking in 0.25-inch and larger size grades. Grade 4 debris can also be taken from control block samples.

6. A stereoscopic, binocular microscope such as those currently in use on the project should prove adequate for microwear analysis. A high intensity illuminator is recommended for use with the microscope, and especially for use in photography through the microscope. Provisions should be made in Phase III for use of a scanning electron microscope as a supplementary instrument for microwear interpretation and for photodocumentation of results for publication.

7. The following activity schedule is suggested for various tasks recommended for Phase III of the project. This schedule is based on this author's limited knowledge of the magnitude of the collections involved; I assume about six sites and 5,000 to 10,000 stone tools to be involved in the intensive Phase III studies.

Experimental studies (knapping, tool use, fracture studies, data recording)	2 - 3 months
Reexamination of tools, microwear documentation, data recording, classification	5 - 8 months
Data editing, data analysis, intra- and inter- site distributional studies	5 - 8 months
Integration of results with other specialists and final report preparation	5 - 8 months
Total estimated duration	17 - 27 months

REFERENCES

Ahler, Stanley A.
1971 Projectile point form and function at Rodgers Shelter, Missouri. _Missouri Archaeological Society, Research Series_ 8.

Ahler, Stanley A.
1975 _Pattern and variety in extended coalescent lithic technology_. Ph.D dissertation, University of Missouri, University Microfilms, Ann Arbor.

Ahler, Stanley A.
1977 Archaeological reconnaissance and test excavation at the Jake White Bull site. Oahe Reservoir, South Dakota. Report submitted to the Corps of Engineers, Omaha.

Ahler, Stanely A.
1979 Functional analysis of nonobsidian artifacts: terms, variables, and quantification. In _Lithic use-wear analysis_, edited by B. Hayden, pp. 301-328. Academic Press, New York.

Brookes, Samuel O.
1979 The Hester site: an Early Archaic occupation in Monroe County, Mississippi. _Mississippi Department of Archives and History, Archaeological Report_ 5.

Odell, G.H.
1979 A new and improved system for retrieval of functional information from microscopic observations on chipped stone tools. In _Lithic use-wear analysis_, edited by B. Hayden, pp. 329-344. Academic Press, New York.

Ranere, A.J.
1975 Toolmaking and tool use among the preceramic peoples of Panama. In _Lithic technology: making and using stone tools_, edited by E. H. Swanson, pp. 173-210. Aldine, Chicago.

Schiffer, Michael B.
1972 Archaeological context and systemic context. _American Antiquity_ 37:156-165.

Tringham, R.G., G. Odell, B. Voytek, and A. Whitman
1974 Experimentation in the formation of edge damage: a new approach to lithic analysis. _Journal of Field Archaeology_ 1:171-196.

Table 1. Summary of the chipped stone tool classification system currently used for the UWF Project, expressed in terms of the functional, technological, use-phase, and morphological content or variability within each group or subdivision.

Morphological Type (Major Group)	Functional Classes Included	Technological Classes Included	Use-Phase Classes Included	Morphological Classes Included	Basis for Category Distinctions Within the Group
01 Projectile Point/ Knife	PP and HCT	large thin bifaces	3 and 4 only	all	morphology (style); portion
02 Biface Blades	PP and HCT	large thin bifaces	1 and 2 only	several	morphology; technology; portion
03 Preforms	PP and HCT	large thin bifaces	1 and 2 only	several	morphology; technology
04 Cores	Cores and PP/HCT	several	3 and 4 only ?	all	technology; morphology; portion
05 Scrapers	several	several	3 and 4 only ?	several	technology; morphology; function
06 Drills, etc.	several	several	3 and 4 only ?	all	function; morphology
07 Other Uniface & Biface Tools	several	several	all ?	several	function; portion

Table 2. Inventory of chipped stone tools in microwear examination sample, by site and morphological type.

Morphological Type	Site 22IT576	Site 22IT539	Total
01 Projectile Point/Knives	11	44	55
02 Biface Blades	20	24	44
03 Preforms	15	26	41
04 Cores	6	66	72
05 Scrapers	27	19	46
06 Drills, Perforators	1	23	24
07 Other	32	8	40
Total	112	210	322

Table 3. Data on chipped stone tools examined for microwear from site 22It576, Levels 13 and 15 combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Biface Blades: (cont.)					
4468-1	On Flake	PP and/or CT	thin biface	1	platform grinding; bkn. in manuf.
5296-1	Prox. Frag.	PP and/or CT	thin biface	2	broken in manufacture; recycled
		*Scraper	thin biface	*3	used on soft material (hide?)
4268-1	Triangular	PP and/or CT	thin biface	2	no distinctive wear
5812-1	Broad Based Triang.	CT	thin biface	*3	resharpened; smoothing wear
4796-1	Prox. Frag. Reworked	*Basal Scraper/Grinder	thin biface	*3	worn and resharpened
4338-1	Ovoid on Flake	*Scraper	thin biface	*3	prox. margin used on soft mat'l.
6062-1	Dist. Frag.	*Adze	*thick biface	*4	intentional lateral grinding
Preforms:					
3823-1	II - Frag.	PP and/or CT	thin biface	2	little wear; bkn. in manuf.
3979-1	I - Frag.	PP and/or CT	thin biface	2	platform prep.; bkn. in manuf.
4119-1	II - Frag.	PP and/or CT	thin biface	2	no wear; bkn. in manuf.
3978-1	I	*Exped. Tool	*irreg. biface	*3	no wear; to small to be PP/K
5290-1	II - Multiuse	PP and/or CT	thin biface	2	no wear; bkn. in manuf.
5265-1	I - On Flake	PP and/or CT	thin biface	2	no wear; heat treatment blank
4538-1	I - Indeterminent	*Core Frag. ?	*non-BP core	*4	no wear; outrepassé flake from bif. core
4861-1	I - Indeterminent	PP and/or CT ?	thin biface ?	2	no distinctive wear
5509-1	I - Indeterminent	PP and/or CT ?	thin biface ?	2	platform grinding; bkn. in manuf.
4562-1	I - On Flake	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
4500-1	I - On Flake	*Exped. CT	*irreg. bif.	*2	no wear; too small to become PP/K
6055-1	II - Indeterminent	PP and/or CT	thin biface	2	platform blunting; bkn. in manuf.
5264-1	II - On Flake	*Adze(Dalton)	*thick biface	*1	no distinctive wear; adze blank
5299-1	I - Cobble	*Core Frag.	*non-BP core	*4	matches w/#4534-1; no wear
5772-1	II - On Flake	*Scraper and CT	thin biface	*3	Kirk resharpening technology; basal scraper wear

Table 3. Data on chipped stone tools examined for microwear from site 22It576, Levels 13 and 15 combined.

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Projectile Point/Knives:					
4286-1	Kirk CN	PP and/or HCT	thin biface	4	resharpened; no distinctive wear
4227-1	Kirk CN	PP and/or HCT	thin biface	4	resharpened; no distinctive wear
4394-1	Kirk CN	PP and/or HCT	thin biface	4	no distinctive wear
5645-1	Kirk CN	PP and HCT	thin biface	4	resharpened; lat. and dist. wear
4349-1	Kirk CN	PP and/or HCT	thin biface	3	resharpened; no distinctive wear
4678-1	Kirk CN	HCT	thin biface	3	resharpened; lateral wear
5770-1	Kirk CN	PP and/or HCT	thin biface	3	resharpened; no distinctive wear
4380-1	Greenbriar	PP and/or HCT	thin biface	4	resharpened; no distinctive wear
4945-1	Big Sandy	PP and/or HCT	thin biface	4	no distinctive wear
4569-1	Big Sandy	PP	thin biface	4	impact fractured; recycled
		*Bipolar Tool	*bipolar	3	shattered from bipolar use
2954-1	Benton Exp. Stem	HCT	thin biface	3	lateral smoothing wear
Biface Blades:					
4051-1	Prox. Frag.	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
4228-1	Med. Frag.	CT	thin biface	*4	lateral smoothing wear
3845-1	Ovoid on Flake	*Exped. CT	*irreg. biface	*3	localized wear; too small for PP/K
4054-1	Prox. Frag.	CT	thin biface	*4	edge blunting wear
4279-1	Prox. Frag.	PP and/or CT	thin biface	2	heat treatment preform
5258-1	Prox. Frag.	PP and/or CT	thin biface	2	broken in manufacture; recycled
		CT	thin biface	*3	used on variable material
4952-1	Prox. Frag.	PP and/or CT	thin biface	2	platform preparation
4364-1	Other	PP and/or CT	thin biface	2	broken in manufacture; recycled
		*Scraper	thin biface	*3	fracture edge used on hard mat'l.
5814-1	Distal Frag.	PP and/or CT	thin biface	2	broken in manufacture
4543-1	Prox. Frag.	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
4480-1	Other	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
4943-1	Prox. Frag.	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
5269-1	Dist. Frag.	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.

Table 3. Data on chipped stone tools examined for microwear from site 22It576, Levels 13 and 15 combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Cores:					
4183-1	Fragment	*Flaking Debris	-	-	bipolar shatter debris
4174-1	Fragment	*Flaking Debris	-	-	bipolar shatter debris
4001-1	Fragment	Core Frag.	non-BP core	4	no wear; exhausted core
4534-1	360^{0}	Core	non-BP core	4	no wear; matches #5299-1
5287-1	Fragment	*Exped. Tool	*irreg. biface	*3	no wear
4668-1	90^{0} Unifacial	Core Frag.	non-BP core	4	no wear; heat treatment blank
Scrapers:					
4003-1	Unif. End	Scraper	patterned unif.	4	used on hard material; recycled
		*Bipolar Tool	*bipolar perc.	3	used as wedge, etc.
4059-1	Unif. Side/End	Scraper	patterned unif.	4	no wear
5969-1	Spokeshare/Bif. Side	*PP and/or CT	*thin biface	*2	no wear; bif. bkn. in manuf.
5737-1	Bif. Hafted End	Scraper	patterned unif.	3	heavy wear; used on abrasive mat'L
4858-1	Unif. Hafted End	Scraper	patterned unif.	3	used on soft material
4327-1	Unif. End/Side -Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	both scraper and CT wear
4435-1	On a Core	Exped. Fl. Tool	unpatterned flake	3	no wear
5325-1	Unid. Fragment	Exped. Fl. Tool	unpatterned flake	4	no wear
5288-1	Unid. Fragment	Exped. Fl. Tool	unpatterned flake	4	no wear
5790-1	Unif. Side - Other Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
4478-1	Unif. Side	Exped. Util. Fl.	unpatterned flake	4	irreg. utilization wear
4359-1	Unif. Side	Exped. Fl. Tool	unpatterned flake	3	no wear
4627-1	Unif. Side-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
5454-1	Unif. Side - Other Fl.	Exped. Fl. Tool	unpatterned flake	3	backed; similar to Kirk technology
5972-1	Unif. Side - Other Fl.	Exped. Fl. Tool	unpatterned flake	4	no wear
4367-1	Unif. Side - On Blade	Exped. Fl. Tool	unpatterned flake	3	no blade; no wear
4757-1	Unif. Side - On Other Fl.	*Fl. Debris	-	-	trowel retouched
5462-1	Spokeshave	Spokeshave	unpatterned flake	3	no wear
4563-1	Spokeshave	Spokeshave	unpatterned flake	3	no wear
5423-1	Unif. Side/End-Other Fl.	Scraper	patterned uniface	4	probably hafted; no use wear

Table 3. **Data on chipped stone tools examined for microwear from site 22It576, Levels 13 and 15 combined. (cont.)**

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Scrapers: (cont.)					
5457-1	Unif. End-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
5791-1	Unif. End-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
5324-1	Unif. End-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
4548-1	Unif. End-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	irreg. utilization wear
5026-1	Unif. End-Other	Exped. Fl. Tool	unpatterned flake	3	no wear
5332-1	Unif. End-Exp. Fl.	*Fl. Debris	-	-	trowel retouch
4278-1	Unif. End-Exp. Fl.	Exped. Fl. Tool	unpatterned flake	3	no diagnostic wear
Perforator:					
4856-1	Perforator	Perforator	unpatterned flake	3	two tips, both slightly worn
Other Unifacial/Bifacial Tools:					
4168-1	Bif. Flake Knife	*Shredder	unpatterned flake	3	denticulate retouch; no wear
3824-1	Bif. Adze Frag.	Adze ?	thick biface	4	edge grinding; use wear unclear
3982-1	Bif. Adze-Prox.	Adze	thick biface	4	intentional lateral dulling
4110-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	edge frag. bkn. in manuf.
3977-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	no wear; bkn. in manuf.
3925-1	Unid. Ch. St. Frag.	*Scraper	*thin biface ?	4	used on soft material; recycled
		*Bipolar tool	*bipolar perc.	3	bipolar wedge, etc.
4109-1	Unid. Ch. St. Frag.	*Core Frag.	*non-BP core	4	no wear
4064-1	Unid. Ch. St. Frag.	*CT	*thin biface	4	used on hard material
4102-1	Unid. Ch. St. Frag.	*CT ?	*thin biface	4 ?	no wear; fractured by facial blow
6076-1	Unif. Fl. Knife	Exped. Util. Flake	unpatterned flake	3	irregular flaking wear
5335-1	Unif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	no wear; Kirk resharpening tech.
5284-1	Unif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	no wear
5587-1	Unif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	no distinctive wear
4794-1	Unif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	backed; Kirk resharpening tech.
4560-1	Unif. Fl. Knife	Exped. Util. Flake	unpatterned flake	3	irregular flaking wear
5262-1	Unif. Fl. Knife	*Core/Core Tool	*thick biface	2	bkn. in heating; recycled
		*Shredder	*unpatterned flake	3	denticulate retouch

Table 3. Data on chipped stone tools examined for microwear from site 22It576, Levels 13 and 15 combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Other Unifacial/Bifacial Tools: (cont.)					
5460-1	Pièces Esquillées	Bipolar Tool	bipolar perc.	3	no wear; bipolar wedge, etc.
4848-1	Bifacial Adze	Adze	thick biface	3	good adze wear pattern
4307-1	Unid. Ch. St. Frag.	*Core Frag.	*non-BP core	4	no wear
4465-1	Unid. Ch. St. Frag.	*Bipolar Tool	*bipolar perc.	3	bipolar wedge, etc.
5308-1	Unid. Ch. St. Frag.	*Core/Core Tool	*non-BP core	4	no wear
4537-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	no wear; bkn. in manuf.
5339-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	bkn. in heating; matches 4835-1, 4827-1
4835-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	bkn. in heating; matches 4827-1, 5339-1
4827-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	bkn. in heating; matches 4835-1, 5339-1
4987-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	platform grinding; bkn. in manuf.
5007-1	Unid. Ch. St. Frag.	*Flaking Debris	-	-	flake from a core
4963-1	Unid. Ch. St. Frag.	*PP and/or ct ?	*thin biface ?	2	no wear
5460-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	platform grinding; bkn in manuf.
6717-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	no wear
4540-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	platform grinding; bkn. in manuf.
5268-1	Unid. Ch. St. Frag.	*PP and/or CT	*thin biface	2	edge blunting; bkn. in manuf.

* indicates a classification inconsistent with the original classification.

abbreviations:
- PP - projectile point
- HCT - hafted cutting tool
- CT - cutting tool
- BP - bipolar percussion
- Exped. - expedient

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined.

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Projectile Point/Knives:					
3361-2	Cypress Creek	HCT	thin biface	4	bkn. in crude resharpening
3360-1	Cypress Creek	HCT ?	thin biface	4	lateral wear, one edge
3359-2	Sykes-White Springs	PP and/or HCT	thin biface	4	no wear; no resharpening
3359-1	Cypress Creek	HCT	thin biface	4	lateral wear on one edge
3361-3	Residual	PP and/or HCT	thin biface	4	no distinctive wear
3441-1	McCorkle	PP and HCT	thin biface	4	hard cutting use; impact also?
1491-1	Benton Barked	PP	thin biface	3	distal smoothing; resharpened
1545-1	Benton Short St.	PP and HCT	thin biface	3	lateral and distal wear
2518-1	Benton Short St.	PP	thin biface	4	distal smoothing wear
1548-1	Benton Short St.	PP	thin biface	4	distal smoothing wear; impact ?
1551-1	Benton Ext. St.	PP and/or HCT	thin biface	4	no edge wear; impact ?
1544-1	Residual Stemmed	PP and/or HCT	thin biface	4	heavy intentional damage
1535-1	Benton Short St.	PP and/or HCT	thin biface	4	little wear; facial blow
1588-1	Benton Short St.	HCT	thin biface	3	lateral smoothing and striations
1590-1	Benton Short St.	HCT	thin biface	3	lateral smoothing wear
2529-1	Benton Short St.	PP and HCT	thin biface	4	lateral and distal wear
2594-1	Crawford Creek	PP and/or HCT	thin biface	3	no edge wear
1502-1	Benton Short St.	PP and/or HCT	thin biface	4	no edge wear; impact ?
1593-1	Benton Short St.	PP and/or HCT	thin biface	4	no edge wear; impact ?
1500-1	Benton Short St.	HCT (and PP?)	thin biface	4	lateral smoothing; impact ?
2568-1	Benton Short St.	PP and/or HCT	thin biface	4	little edge wear
2569-1	Benton Short St.	HCT (and PP?)	thin biface	4	lateral smoothing; impact ?
2525-1	Benton Short St.	PP and/or HCT	thin biface	4	little distinctive wear
1620-1	Benton Short St.	PP and/or HCT	thin biface	4	no edge wear
2606-1	Benton Short St.	PP and/or HCT	thin biface	4	no edge wear
2607-1	Benton Short St.	PP and HCT	thin biface	4	much smoothing wear; heat fract.
2635-1	Benton Short St.	HCT	thin biface	4	lateral wear striations; resharp.
2667-1	Benton Extend. St.	HCT	thin biface	4	lateral smoothing
2795-1	Benton Extend. St.	PP	thin biface	4	no edge wear impact likely

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Projectile Point/Knives: (cont.)					
2803-1	Benton Short St.	PP and HCT	thin biface	3	hard lat. wear; distal smoothing
2899-1	Residual Stemmed	PP and/or HCT	thin biface	4	heavy intentional damage
2909-1	Residual Stemmed	HCT (and PP ?)	thin biface	4	hard lat. wear; impact ?
1558-1	Unid. Distal Frag.	PP and/or HCT	thin biface	4	no wear; hinge fracture
1559-1	Unid. Distal Frag.	HCT	thin biface	4	used on hard material; heat fract.
1610-1	Unid. Distal Frag.	PP and/or HCT	thin biface	4	no wear; heat fract.
1612-1	Unid. Distal Frag.	HCT (and PP ?)	thin biface	4	lateral smoothing; impact ?
1632-1	Unid. Distal Frag.	PP	thin biface	4	distal wear; impact fract.
2846-1	Unid. Med. Frag.	HCT	thin biface	4	lateral wear; heat fract.
2826-1	Unid. Med. Frag.	HCT (and PP ?)	thin biface	4	lateral wear; impact fract. ?
2468-1 ?	Unid. Med. Frag.	PP and/or HCT	thin biface	4	no wear; heat fracture
2455-1	Unid. Med. Frag.	PP and/or HCT	thin biface	4	little wear; heat fracture
2723-1	Unid. Med. Frag.	HCT (and PP ?)	thin biface	4	lateral smoothing; impact ?
2895-1	Unid. Med. Frag.	PP and/or HCT	thin biface	4	little wear; impact ?
2529-2	Unfin. Small Triang.	PP ?	small thin biface	2 ?	no wear
Biface Blades:					
2761-6	Triangular-Other	PP and/or CT	thin biface	2	heat fract; bkn. in manuf.
2761-5	Triangular-Other	PP and/or CT	thin biface	1	heat treatment blank
2999-7	Rehafted Frag.	PP and/or HCT	thin biface	*4	tip of Benton?; resharpened
3064-1	Triangular-Other	PP and/or HCT	thin biface	2	quarry blank; heat fract.
2931-3	Rehafted Frag.	PP and/or HCT	thin biface	*4	no distinctive wear
3065-1	Triangular-Other	PP and/or HCT	thin biface	2	platform grinding; bkn. in manuf.
2751-10	Proximal Frag.	HCT	thin biface	*4	lateral smoothing; recycled
		*Scraper	thin biface	*4	resharpened
3013-5	Distal Frag.	PP and HCT	thin biface	*4	lateral blunting; distal wear
2999-6	Distal Frag.	PP and/or HCT	thin biface	2	heat fract; bkn. before use
3063-1	Medial Frag.	PP and/or HCT	thin biface	2	platform grinding; bkn. in manuf.
2757-9	Medial Frag.	PP and/or HCT	thin biface	2	platform dulling; bkn. in manuf.

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Biface Blades: (cont.)					
3164-5	Ovoid Frag.	HCT	thin biface	*4	smoothing wear
3310-10	Exp. Triang. - Flake	PP and/or HCT	thin biface	2	platform grinding; heat fract.
3151-5	Exp. Triang. - Flake	PP and/or HCT	thin biface	2	platform grinding; bkn. in manuf.
3171-11	Medial Frag.	CT	thin biface	*3	used as CT after fracture
3173-7	Prox. Frag.	PP and/or HCT	thin biface	2	no wear; heat fract.
3174-1	Distal Frag.	PP and/or HCT	thin biface	2	no wear; bkn. in manuf.
3204-10	Distal Frag.	PP and/or CT ?	thin biface ?	2	no wear; bkn. in manuf.
3371-6	Triangular-Other	HCT	thin biface	*3	probably hafted CT
3452-4	Medial Frag.	HCT (and PP ?)	thin biface	*4	lateral wear; impact ?
3426-7	Rehafted Frag.	PP and/or HCT	thin biface	*4	heavy intentional damage
3567-4	Rehafted Frag.	PP and/or HCT	thin biface	*4	heavy intentional damage
2775-8	Triangular	CT	thin biface	*4	use on hard mat'l; heat fract.
2698-1	Triangular-Other	PP and/or HCT	thin biface	2	platform grinding; bkn. in manuf.
		CT	thin biface	*3	used after fracture
Preforms:					
4583-20	II - Unid.	*Adze	*thick biface	*4	dulled for hafting
3542-5	II - Flake	PP and/or CT	thin biface	2	heat treatment blank; bkn. manuf.
3563-6	I - Cobble	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
4986-1	II - Frag.	PP and/or CT	thin biface	2	bkn. in manuf.
3451-9	II - Flake	PP and/or CT	thin biface	2	no wear; bkn. in manuf.
3209-2	II - Flake	*Expedient Tool	*irreg. biface	*3	no wear
3209-3	II - Flake	PP and/or CT	thin biface	2	heat treat. blank; bkn. in manuf.
3263-4	II - Flake	PP and/or CT	thin biface	2	platform grinding; bkn. in manuf.
3322-17	II - Flake	*Expedient Tool	*irreg. biface	*3	smoothing wear, localized.
3334-3	II - Indeter.	PP and/or CT	thin biface	2	facial smashing
3442-3	I - Flake	*Expedient Tool	*irreg. biface	*3	scraping wear
3563-5	I - Flake	*Adze	*thick biface	*4	dulling for hafting
4596-8	I - Flake	*Expedient Tool	*irreg. biface	*3	no wear

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Preforms: (cont.)					
3151-6	I - Frag.	PP and/or CT	thin biface	2	no wear
3181-7	I - S/D	PP and/or CT ?	thin biface ?	2	no wear; bkn. in manuf.
3322-16	I - Cobble	*Chopper	*thick biface	*4	macro-flaking wear on ends
2756-10	I - Indeter.	*Expedient Tool	*irreg. biface	*3	irreg. flaking wear
3061-3	I - Indeter.	*Chopper	*thick biface	*4	localized flaking wear
1550-1	II -	*Bipolar Chisel	*thick biface	*3	step flaking on one end
4609-1	Quarry Blade	PP and/or HCT	thin biface	1	uniform non-use wear
4610-1	Quarry Blade	PP and/or HCT	thin biface	1	uniform non-use wear
4612-1	Quarry Blade	PP and/or HCT	thin biface	1	uniform non-use wear
4613-1	Quarry Blade	PP and/or HCT	thin biface	1	uniform non-use wear
4614-1	Quarry Blade	PP and/or HCT	thin biface	1	uniform non-use wear
5778-1	Quarry Blade	PP and/or HCT	thin biface	1	handling wear removed by flaking
5779-1	Quarry Blade	PP and/or HCT	thin biface	1	handling wear removed by flaking
Cores:					
11-6	Microblade	"Marble" Core	*non-BP core	4	not microblade; no wear
15-315	90° Unif.	Core	non-BP core	3	no wear; heated
15-316	180° Unif.	Core (and Scraper?)	non-PP core	3	one edge unif. flaked (scraper)
24-142	Bipolar Frag.	*Expedient Tool	*irreg. biface	2	not bipolar; bkn. in manuf.
55-3	270° Unif.	*Chopper	non-BP core	3	heavy wear on one edge
1389-21	Microblade	*Chopper/Adze	*non-BP core	4	edge wear; not microblade
1406-80	180° Op. Unif.	Core	non-BP core	4	no wear
1429-17	270° Bifacial	Core	non-BP core	3	two flaking episodes
1481-2	360° Bifacial	Core ?	non-BP core	3	possible tool use also
1504-203	Microblade	*Fl. Debris	-	-	thick, cortical flake
1577-47	Microblade	Core	microblade	4	exhausted
1584-23	360° Unif.	Core	non-BP core	4	no wear
1639-54	90° Unif.	Core	non-BP core	3	no wear
1642-84	270° Unif.	*Core-Hammer	non-BP core	3	hammer wear

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Cores: (cont.)					
1744-14	360^{o} Unif.	Core	non-BP core	4	no wear; exhausted
1759-814	Microblade	Core	*non-BP core	4	not microblade
1790-56	270^{o} Unif.	*Scraper	*unpatterned flake	3	used on soft material
1813-2	90^{o} Unif.	Core	non-BP core	3	tested raw material
1900-60	Microblade	*Shatter	-	-	flaking debris only
2036-9	270^{o} Unif.	Core	non-BP core	4	no wear
2036-40	90^{o} Unif.	Core	non-BP core	4	no wear; exhausted
2036-41	180^{o} Unif.	Core	non-BP core	4	exhausted
2319-5	180^{o} Bif. Adj.	*Core-Hammer	non-BP core	3	heavy batter wear
2338-30	90^{o} Unif.	Core	non-BP core	4	tested raw material
2388-3	Microblade	"Marble" core	*irreg. biface	4	no microblade
2389-1	180^{o} Bif. Adj.	*Core Scraper	non-BP core	3	good scraper wear
2394-65	180^{o} Unif. Opp.	*Natural Rock	-	-	not modified
2394-16	Bipolar	*Exped. Flake Tool	*unpatterned flake	3	not bipolar, only a ret. flake
2395-4	180^{o} Bif. Adj.	*Chopper-Pounder	non-BP core	3	crushing wear
2395-5	180^{o} Unif. Opp.	*Chopper	non-BP core	3	edge step flaking wear
2405-13	180^{o} Unif. Opp.	Core	non-BP core	4	exhausted
2436-7	270^{o} Unif.	Core	non-BP core	4	frag. bkn. during flaking
2510-5	270^{o} Bif. Diag.	Core	non-BP core	3	no wear
2661-1	90^{o} Unif.	*Chopper	non-BP core	4	heavy crushing; heat fractured
2775-10	90^{o} Unif.	*Chopper	non-BP core	3	heavy crushing
2907-1	180^{o} Unif. Opp.	Core	non-BP core	3	one end of multipurpose tool
		*Hammer	rough stone	3	one end of multipurpose tool
2999-8	90^{o} Unif.	*Exped. Tool	*irreg. biface	3	made on heat bkn. frag.
3013-6	90^{o} Unif.-Cobble	*Chopper	non-BP core	3	heavy crushing
3152-2	Bipolar	*Bipolar Tool	bipolar perc.	3	recycled biface ?, not a core
3183-20	90^{o} Unif	PP and/or CT	thin biface	2	bkn. in heating; recycled
		*Exped. Fl. Tool	*unpatterned flake	3	retouched tool
3193-6	Blade	Core	*non-BP core	4	non-blade technology

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Cores: (cont.)					
3199-3	90° Unif.	Core	non-BP core	4	no wear
5132-8	270° Unif.	Core	non-BP core	4	heated, poorly flaked
5133-3	90° Bif.	Core	non-BP core	4	core frag. recycled
		*Exped. Tool	*irreg. biface	3	no wear
5137-6	90° Bif.	"Marble" Core	non-BP core	4	too small to be useful core
5215-6	90° Unif.	Core	non-BP core	3	no wear; tested cobble
5242-1	90° Unif.	Core	non-BP core	4	tested cobble, not useful
5298-1	90° Bif.	Core	non-BP core	3	no wear
5346-1	360° Bif.	"Marble" Core	non-BP core	4	too small to be useful core
5348-4	100° Bif. Opp.	"Marble" Core	non-BP core	4	too small to be useful core; matches 5370-3
5368-1	270° Bif.	Core?	non-BP core	4	uncertain function
5370-3	90° Bif.	"Marble" Core	non-BP core	4	fits 5348-4
5457-1	180° Unif. Adj.	Core	non-BP core	4	large "marble" core ?
5492-1	Blade	Core	blade	4	no wear; recycled by unif. ret.
		*Exped. Fl. Tool	unpatterned flake	3	unif. ret., no wear
5522-5	180° Bif. Adj.	*Bipolar Tool	bipolar perc.	3	semi-bipolarized crushing
5594-3	180° Bif. Adj.	*Exped. Tool	*irreg. biface	3	flake w/irreg. retouch
5601-3	90° Unif.	*Bipolar Tool	*bipolar perc.	3	no wear
5604-9	360° Unif.	Core	non-BP core	4	no wear
5680-1	90° Unif.	*Chopper	non-BP core	3	heavy wear both ends
5694-203	90° Unif.	*Exped. Tool	*irreg. biface	3	smoothing wear; used on soft mat'l.
5725-8	270° Unif.	Core	non-BP core	3	random wear
5732-1	90° Bif.	Core	non-BP core	3	tested raw material
5844-6	Bipolar	*Bipolar Tool	bipolar perc.	3 ?	resembles "marble" cores
5967-2	90° Unif.	Core	non-BP core	4	no wear
6138-1	270° Bif.	Core	non-BP core	4	no wear; exhausted
3359-4	90° Unif.	Core	non-BP core	4	no wear; tested and discarded

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
Scrapers:					
3359-5	Unif. End-Exp. Fl.	Scraper	unpatterned flake	3	used on hard material
3360-15	Unif. Side-Other	Scraper	unpatterned flake	3	used on hard material
4582-3	Other-Reworked PP/K	*PP and/or HCT	thin biface	4	recycled by unifacial smashing
		Exped. Tool	irreg. biface	3	irreg. flaking wear
4583-21	Unif. End-Exp. Fl.	Scraper	patterned unif.	4	hafted; used on soft material
4596-9	Unif. Side-Other Fl.	Exped. Fl. Tool	unpatterned flake	4	no diagnostic wear
4587-6	Unif. Side/End-Fl.	Exped. Fl. Tool	unpatterned flake	4	no wear
3423-5	Unif. Side-Other Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
3452-6	Unif. End-Exp. Fl.	Scraper	unpatterned flake	3	used on hard mat'l; not hafted
3457-7	Unif. Side-Other Fl.	Scraper	patterned unif.	4	use on soft mat'l; hafted
3543-3	Unif. End-Exp. Fl.	Scraper	patterned unif.	4	use on soft mat'l; hafted
3567-5	Unif. Side/End - Fl.	Exped. Fl. Tool	unpatterned flake	3	uniform wear all over
3029-2	Unif. Side-Other Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
2743-8	Unif. Side/End - Oth. Fl.	Exped. Fl. Tool	unpatterned flake	3	no wear
3288-5	On Bif. Frag.	*PP and HCT	*thin biface	4	dist. and lat. wear; recycled
		Exped. Fl. Tool	unpatterned flake	3	no wear
3310-12	Bif. Hafted	*PP and/or HCT	*thin biface	4	heavy intentional smashing
3173-8	Unif. Side-Other Fl.	Exped. Fl. Tool	unpatterned flake	4	no wear
3310-11	Unif.-Blade-like Fl.	Multipurpose	unpatterned flake	3	hard and soft wear on different edges
3334-5	Unif. Side/End-Exp. Fl.	Scraper	patterned unif.	3	used on soft mat'l; hafted
3204-11	Unif. End-Exp. Fl.	Scraper	patterned unif.	3	no use wear; resharpened; hafted
Drills/Perforators:					
3080-3	Shaft Drill	Drill and/or Awl	thin biface	3	smoothing wear both ends.
3021-3	Prox. Frag.-Reworked	Drill and/or Awl	thin biface	4	no use wear
3028-8	Unid. Frag.	Drill	thin biface	4	clear rotary wear; heat fract.
2761-7	Dist. Frag.	Drill and/or Awl	thin biface	4	smoothing wear
2930-9	Dist. Frag.	Drill	thin biface	4	rotary wear

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No	Original Classification	Function	Technology	Use-Phase	Comments
Drills/Perforators: (cont.)					
2999-9	Dist. Frag.	Drill ?	thin biface	4	possible rotary wear
3035-4	Dist. Frag.	Drill	thin biface	4	rotary wear; hard material
3061-2	Med. Frag.	Drill	thin biface	4	probable rotary wear
3080-4	Med. Frag.	Drill and/or Awl	thin biface	4	no wear; heat fracture
2757-12	Dist. Frag.	Drill and/or Awl	thin biface	4	smoothing wear
2757-11	Dist. Frag.	Drill	thin biface	4	rotary wear on hard material
3402-10	Dist. Frag.	Drill	thin biface	4	rotary wear on hard material
3442-5	Dist. Frag.	Drill	thin biface	4	rotary wear on soft material
4582-4	Dist. Frag.	Drill and/or Awl	thin biface	4	no wear
3246-3	Shaft Drill	Drill and/or Awl	thin biface	4	no distinctive wear
3143-8	Shaft Drill	Drill and/or Awl	thin biface	4	no wear
3226-7	Stemmed Frag.	*PP and/or HCT	thin biface	4	no wear remaining; recycled
		Drill	thin biface	3	rotary wear on soft material
3322-19	Exp. Base	Drill	thin biface	3	rotary wear on soft material
3263-6	Med. Frag.	Drill and/or Awl	thin biface	4	no wear
3291-4	Med. Frag.	Drill	thin biface	4	rotary wear on hard material
3173-9	Med. Frag.	Drill and/or Awl	thin biface	4	no wear
3296-3	Med. Frag.	Drill	thin biface	4	rotary wear on soft material
3246-4	Med. Frag.	Drill and/or Awl	thin biface	4	no wear
Other Unifacial/Bifacial Tools:					
3334-6	Bif. Adze	*Exped. Tool	irreg. biface	3	retouched heat spall; no wear
3296-5	Unif. Adze	*Exped. Tool	*irreg. biface	3	flaked pebble; irreg. wear
3538-6	Unif. Adze	Adze	*non-BP core	3	unworn; ready for use
3080-5	Bif. Fl. Knife	*Scraper ?	patterned unif.	4	frag. of hafted scraper ?
2751-11	Bif. Fl. Knife	Shredder/Scraper	unpatterned flake	3	two edges, two functions
3173-11	Bif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	two edges

Table 4. Data on chipped stone tools examined for microwear from site 22It539, all samples combined. (cont.)

ID No.	Original Classification	Function	Technology	Use-Phase	Comments
<u>Other Unifacial/Bifacial Tools</u>: (cont.)					
3204-23	Bif. Fl. Knife/Spoke.	Shredder	unpatterned flake	3	no wear
1630-1	Unif. Fl. Knife	Exped. Fl. Tool	unpatterned flake	3	no wear

* indicates classification inconsistent with original classification

abbreviations:
PP - Projectile point
HCT - hafted cutting tool
CT - cutting tool
BP - bipolar percussion
Exped. - expedient

Table 5. Percentages of tools occurring in each morphological type which, upon intensive examination, are determined to belong to functional, technological, or use-phase classes inconsistent with the classes implied by the original type/category placement.

Morphological Type	Inconsistency in Classification Function	Technology	Use-Phase	Comments
Projectile Point/Knife	2%	2%	0%	Much more specific functional classification is possible.
Biface Blades	16%	5%	50%	Many used tools.
Preforms	39%	37%	39%	Several used tools.
Cores	43%	22%	NA	Many core-tools.
Scrapers	15%	9%	NA	Much more specific functional classification is possible.
Drills/Perf.	4%	0%	NA	Good agreement.
Other Unif./ Bif. Tools	63%	54%	NA	Much more specific classification possible for fragments.

PRELIMINARY STUDY OF THE FORMATIONS AND LITHOLOGY

OF STONE TOOL RAW MATERIALS

by

PROJECT STAFF

June 1981

RESOURCE FORMATIONS

Many geologic formations have supplied the neccessary raw materials for lithic tool production in the Upper Tombigbee Valley, but four are responsible for the majority of the material. The following is a brief description of these formations and their relationship to the valley.

TUSCALOOSA FORMATION

The closest and most intensively exploited formation for lithic resources is the Late Cretaceous Tuscaloosa formation (Marchen and Stearns 1962). This formation is located a short distance north and east of the Upper Tombigbee Valley and is the parent material for most of the Tombigbee Valley alluvial gravel deposits. The formation consists of poorly sorted gravel, sandstone pebbles, quartz and quartzite pebbles, sand, silt, and clay, with interbedded zones of conglomerate and ferruginous sandstone. The chert is Devonian (Camden fm.) and Mississippian (Ft. Payne, Warsaw, and St. Louis fms.) and has been eroded from the parent formations, transported by fluvial action, and then redeposited to form the Tuscaloosa formation. These transported materials are well-rounded cobbles that are often chalky, or tripolitic. This formation probably supplied 75% of the material used for lithic tool manufacture in this area, plus a large percentage of the conglomerate and ferruginous sandstone used for ground stone and large, heavy-duty tools.

FT. PAYNE FORMATION

The closest accessible outcrop of the Ft. Payne formation, the basal member of Mississippian age, is located 72 km north of the research area in the extreme northeastern corner of Mississippi. This cherty formation, first described by Smith (1898:155-156), outcrops in southern Tennessee, northeastern Mississippi, northern Alabama, and northern Georgia. This chert formation, often thick bedded, exhibits limestone and clay-shale members in some areas and often erodes out of the formation in thick, blocky slabs due to an inherent system of blocky fracture planes. Round nodular forms have been noted in several locales. The fossiliferous forms of Ft. Payne chert are usually highly angular and blocky. Ft. Payne chert is considered a secondary silicification of limestone; the gross structure of the cherts may reflect the original limestone bedding tendencies.

BANGOR FORMATION

Outcrops of the Upper Mississippian Bangor formation occur in Colbert and Franklin Counties, Alabama, and east across northern Alabama and some areas of Tennessee. Smith (1894) first referenced this formation. The closest resource to the research area would be approximately 80 km to the east in Franklin County, Alabama (Bond 1980). The Bangor formation is mainly a thick-bedded, dark-bluish limestone which becomes less fossiliferous further east in its basal member. Bangor cherts range from round, nodular forms to blocky slabs. The fossiliferous forms of Bangor normally occur in blocky forms, while the non-fossiliferous varieties are usually rounded nodules.

TALLAHATTA FORMATION

The Tallahatta formation is found in the Cenozoic Claiborne group, outcrops across south-central Alabama into Mississippi, and turns north through central Mississippi (Copeland 1968). This formation, the most distant of the main lithic resources, outcrops over 160 km from the research area. The formation is composed primarily of clay, sandstone, and sandy claystone, but in certain areas silica has cemented the claystone forming a quartzite which can be chipped into stone tools (Dunning 1964).

These formations (Tuscaloosa, Ft. Payne, Bangor, and Tallahatta) possibly supplied 95% of the raw lithic material for lithic tool manufacture in this area. The remaining 5% came from a wide range of formations scattered from the Gulf of Mexico to Arkansas, through Missouri, Illinois, Ohio, Kentucky, Tennessee, Alabama, and Georgia. These more exotic resources normally occur as finished tools or small retouch flakes from tool resharpening.

LOCAL LITHIC MATERIAL

This section is a detailed description of the material categories. Several conventions were used to standarize the description:

1) color word descriptions and the Munsell Soil Color Chart notation system;
2) a subjective five point gradation scale for luster (dull, low, medium, medium-high, high);
3) a subjective five point gradation scale for grain size (fine, medium-fine, medium, medium-coarse, coarse); and
4) a subjective five point gradation scale for flaking ease (bad, poor, fair, good, excellent).

The following descriptions cover the most common materials found on sites in the research area.

UNHEATED CAMDEN

The most frequent material in the Tuscaloosa formation, this chert in its unheated state ranges from white to pale yellow through yellow to olive yellow (2.5Y 8/2, 8/4, 8/8, 7/8), with several colors often mottled through the same cobble. Some pieces are light gray to gray (2.5Y N7/, N5/). The grain size varies, ranging from fine to coarse grained, and may vary within a single cobble. Some mottles within a cobble may be grained chalcedonic or opaline quartz, but open fissures filled with druse quartz may also occur. Luster is variable, ranging from dull to medium-high. Cobbles are well rounded with a cortex development of less than 1 mm to 2 mm. The flaking quality ranges from poor to fair in the unheated state. The high variability within the Camden group may be a result of mixing in the Tuscaloosa formation. Another cause of variability is that this category was used as a catchall for most of the material from this formation.

HEATED CAMDEN

After heating, the color of Camden chert may vary from pinkish white to pink, through reddish yellow to yellowish red (5YR 8/2, 8/4, 7/8 5/8). Some pieces take on more brilliant hues of light and red (10R 6/8, 4/8). The luster often changes with heating, with a range of low to high. With this shift in luster, there is a marked improvement in flaking quality, ranging from fair to excellent.

UNHEATED YELLOW TUSCALOOSA

Unheated Yellow chert is a sub-group of the Tuscaloosa formation, and in its unheated state has a brownish yellow to yellowish brown range (10YR 6/6, 5/8) with no mottles and a steady uniform color throughout the cobble. The grain size varies from fine to coarse, and this variability may be found within a single cobble. As in the case of most Tuscaloosa cherts druse filled voids are sometimes found. Luster varies from dull to medium-high and flaking ranges form poor to good. The cobbles are well rounded with minimal cortex development (1 to 2 mm).

HEATED YELLOW TUSCALOOSA

Yellow Tuscaloosa chert upon heating may change to red or dark d (10R 4/8, 3/6). Totally heat altered pieces are solid red, ..t partially heated pieces will grade from red to yellow. The luster changes with heating, shifting from medium to high, and the flaking quality normally improves from good to excellent.

BLUE-GREEN BANGOR

Blue-Green Bangor ranges in color from light blue-green through dark blue-green, and sometimes dark gray (5BG 6/1, 5BG 4/1, 5Y 4/1). This material from the Bangor formation is often uniformly colored. Sometimes a shift in color shade occurs from the exterior to the interior of the cobble, with the darker shade on the interior. The grain size is normally fine to medium-fine; thin flakes tend to be translucent. This chert's luster is normally medium to high, and the flaking quality is usually fair to excellent. Blue-Green Bangor occurs in irregular, flat to round nodules and has a calcareous cortex.

LITTLE MOUNTAIN BANGOR

Little Mountain Bangor, mottled and banded tan and blue-green (10YR 7/4, 5BG 4/1), is another chert variety found in the Bangor formation. The tan areas, medium to medium-coarse grained with occasional fossil fragments, maintain a low to medium luster. In thin flakes the tan areas remain opaque. The blue-green areas are fine to medium-fine grained, exhibit a medium to high luster, and lack fossil fragments. In thin flakes, the blue-green area will be translucent. This chert often forms blocky cortical nodules with blocky fracture planes. Flaking is hampered by texture variability within a nodule, but it is generally fair.

FOSSILIFEROUS BANGOR

Fossiliferous Bangor includes all the fossiliferous forms from the Bangor formation except the Little Mountain variety. It ranges from blue-green to dark blue-green, and dark gray (5BG 5/1, 5BG 4/1, 5GY 4/1, 5Y 4/1); fossil fragments often appear translucent white. The background matrix surrounding the fossil inclusions is fine grained, whereas the fossils sometimes have been leached, leaving voids in the chert. The luster is medium to high. Fossiliferous Bangor nodules are normally thick and blocky with square block fracture planes. Flaking quality is

poor to fair due to a heavy, pitted cortex, although an occasional piece is good. Within individual samples the fossils and fossil fragments usually maintain uniform size grade. Bangor fossils may range from 1 mm to 2 mm in diameter. Crinoids are plentiful, but key fossils include Bryozoa, especially Fenestalla and related genera. The key Bangor index fossil is Bryozoa archimedes (McKinney 1972). The main screw axis of this fossil is rarely evident, but parts of the revolving calluliferous fronds which attach to the axis are often present.

FT. PAYNE CHERT

The material from this formation is highly variable, ranging from light gray or blue to blue-gray, dark gray or black (7.5YR N7/, 5B 7/1, 5B 6/1, 5B 4/1, 7.5YR N2/), with light blue translucent mottles occurring in some of the darker varieties. The lighter colored, more coarse grained forms may become yellow or tan with weathering (10YR 8/6, 6/8). Some of the Ft. Payne cherts when subjected to thermal alteration, will turn darker gray, or with intense heat may even turn clear red (5R 4/8). Most of the Ft. Payne cherts have an open porous grain in the medium to coarse ranges. Some of the darker specimens are more compact and will have a medium-fine grain size. Luster ranges from dull to medium-high, with darker specimens having a higher luster. The flaking quality of this material normally ranges from fair to excellent. Nodules often have a thick cortex of rough-grained coarse chert which must be removed to reach the more workable, inner fine-grained material.

FOSSILIFEROUS FT. PAYNE

The fossiliferous forms of Ft. Payne range from light gray to blue-gray, to blue, white, tan, and brown (10YR 7/2, 5BG 6/1, 5BG 5/1, 10YR 8/2, 10YR 7/6, 10YR 6/8), with the fossils normally being a slightly darker opaque shade than the surrounding matrix. The grain and fossil size seems to correlate with the chert color: the darker blue-gray and blue forms have a medium-fine grain size and highly fragmented small fossils peppered throughout the cobble. The lighter colored cherts have a medium to coarse texture with larger and more varied sizes of fossils through the cobble. When the formational history of the cherts varies, color and inclusion usually differ. The finer cherts have a medium luster; the coarser cherts exhibit a dull to low luster surface. This material often forms in thick, blocky nodules, with square block fractures, which have medium thick pitted cortex. The flaking quality is fair to good in general. In all but the fine grain forms, the Ft. Payne fossils are nor-

mally highly fragmented and poorly sorted by size. The majority of fossils are crinoid fragments, but the key Ft. Payne formation fossils are marked by specific brachiopods, and the absence of Bryozoa. The key brachiopods are larger fossil fragments of Spirifer logani and Spirifer crawfords-villensis.

TALLAHATTA QUARTZITE

Tallahatta Quartzite is a sandstone that has turned to quartzite by silica cemetation. This coarse grained material ranges from white to light gray to gray, and is found in a gray-white-tan mottled form with white translucent patches (2.5Y N8/, N7/, 7/2, N6/, 6/2). It has a medium luster on the translucent white areas, but generally it is dull. The coarse grain and poor cementation causes it to erode rapidly, and this is one key factor in sorting Tallahatta from other quartzites. When freshly broken it flakes fair to good, but after artifact manufacture, weathering may obliterate flake scars giving the artifact the false appearance of being ground.

QUARTZ

Quartz usually originates from the Tuscaloosa formation in well-rounded cobble or pebble form. This white to yellow, (10YR 8/1 - 8/8) fine grained material has a high luster on fresh surfaces and is normally difficult to flake. Quartz cobbles are often used as hammerstones.

QUARTZITE

Quartzite is derived primarily from the Tuscaloosa formation. This white to yellow (10YR 8/1 - 8/8) highly cemented, coarse grained quartzite exhibits a high luster on a fresh break and rates bad to poor for flaking. Quartzite was often used for hammerstones and large flaked choppers.

CONGLOMERATE

Conglomerate is also found in the Tuscaloosa formation and other Upper Cretaceous formations in the research area. Composed primarily of yellow chert in rounded or subangular fragments greater than 2 mm in diameter, it is cemented together by a fine grained matrix of quartz grains, iron oxides, and silica which approaches

the hardness of quartzite. This coarse grained material may have a medium to medium-fine luster on a fresh surface, and the flaking is fair in well-cemented specimens. Conglomerate was often used for large flaked tools, such as axes, adzes, and choppers, which could absorb a heavy shock.

FERRUGINOUS SANDSTONE

This plentiful material, found in the Tuscaloosa and other Upper Cretaceous formations in the research area, had many aboriginal uses. The best pieces for lithic manufacture are those which are highly silicified and resemble quartzite. This resource is basically quartz sand grains cemented together by silica and iron compounds which gives it a reddish-black to black color (2.5YR 3/4, N2.5/). Ferruginous Sandstone is coarse grained, but it may have a medium to medium-fine luster on fresh breaks in well-cemented pieces. Flaking quality can be fair in strongly cemented specimens. This material, when flaked, was most often used for heavy duty tools such as axes, choppers, and digging tools.

NOVACULITE

Novaculite is metamorphosed, even-textured, cryptocrystalline, siliceous rock which is medium-fine to fine grained and ranges from white to gray through black, and may take on a light pinkish tinge after heat treatment (5YR 8/1, 6/1, 4/1, 2.5/1, 7/3). The luster is low to medium, but after heat treatment the luster may improve to medium-fine. Flaking quality is fair to good, but sometimes the material breaks into flat plates and flakes may feather in odd directions or hinge fractures may develop. Heat treatment helps eliminate these problems.

PICKWICK

Outcropping in the Ft. Payne formation in the western middle Tennessee Valley, particularly Pickwick Landing Reservoir, or reincorporated into the Tuscaloosa formation, Pickwick chert exhibits a characteristic three color banding or mottling: yellow to whitish yellow (10YR 8/3 - 8/8, 7/8), red (2.5YR 6/8 - 4/8), and blue-black to dark gray (5B 4/1, N4/, N6). The black or gray is normally at the cortex of the cobble, the yellow is next, and the red is normally at the center. Distinct banding is sometimes not evident and the red may be mottled through the yellow or missing. The material found directly in the Ft. Payne formation

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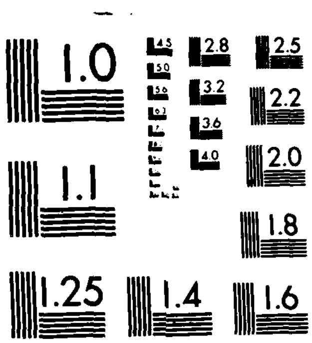

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normally has a higher porosity, medium to coarse grain size, and dull to low luster, but flaking is fair to good. The Pickwick chert incorporated in the Tuscaloosa formation has medium to medium-fine grain due to re-silicification. As a result, the luster averages medium, but the flaking quality is only fair. The material found in Pickwick Landing Reservoir forms in flat, angular cobbles with heavy cortex, but the redeposited Tuscaloosa cobbles are rounded with a thin cortex (1 mm to 2 mm).

EXOTIC LITHIC MATERIAL

The cherts defined below are the exotic items which make up a small fraction of the lithic debitage recovered from the excavations. These are given a short description because there has not been sufficient time or material for detailed study.

COASTAL PLAIN AGATE

Coastal Plain Agate is a waxy, translucent cryptocrystalline quartz, also described as variegated chalcedony. Silica patterns may occur in bands, clouds or distinct groups of colors such as black, gray, purple, blue, and pink. The agate bears a white, calcareous corex and is found in thin laminated beds on the outer Coastal Plain.

WHITE CHERT

White chert is a homogenous chert found on the Coastal Plain of Alabama. Fine to coarse grained, it occurs in flat tabular blocks and is often heavily patinated.

CUMBERLAND

Cumberland chert which outcrops along the Cumberland Valley in northern-central Tennessee and southern-central Kentucky is a variety of Ft. Payne chert. This chert is fine grained, brownish black to olive black with occasional tan calcareous mottles or bands.

GRAY BUFFALO RIVER

This chert is another variety of Ft. Payne chert which outcrops along the Buffalo River in southern-central Tennessee. This material is medium grained, light-gray to gray, with a distinctive banding system of thin darker gray bands alternating with wider lighter gray bands.

JASPER

Jasper is a slightly translucent to opaque, compact, cryptocrystalline quartz with a dull appearance in fresh fractures and normally stained red to reddish-brown by iron oxides.

CHALCEDONY

Chalcedony is a cryptocrystalline chert or quartz which bears certain agate qualities of translucence and high luster. Microscopic examination often indicates a fibrous structure.

OOLITIC CHERT

Oolitic chert bears masses of small spherical to ellipsoidal bodies (0.25 mm to 2 mm in diameter) called oolites, which are distinguished from fossils because they probably have a non-organic origin. Oolites may have a nucleus such as a quartz grain and radical or concentric structures.

FLINT RIDGE

This chert is highly variable with a fine to medium texture and a variety of colors: light blue, pink, gray, brown, white, red. This chert is found in the Ohio Valley.

UNIDENTIFIED CHERT

Unidentified cherts are those which exhibit certain qualities or characteristics that do not conform to our established categories.

REFERENCES CITED

Dunning, Arthur B.
1964 The Tallhatta formation in Clark County, Alabama, Journal of Alabama Archaeology 10:50-60

Marchen, Melvin V. and Richard G. Stearns
1962 Tuscaloosa formation in Tennessee, Tennessee Department of Conservation, Division of Geology, Report of Investigations 17.

Smith, Eugene A.
1894 Geology of the coastal plain of Alabama, Geological Survey of Alabama.

APPENDIX IV

LABORATORY MANUAL

by

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INTRODUCTION

This document was designed as a training aid and for use as a reference document. This manual went through several drafts and was regularly updated as procedures were streamlined or new tasks were added to the laboratory duties. The manual presents a step-by-step description of all procedures and was written primarly for new employees. All laboratory team leaders and most crew members had a copy of the manual at their work station.

This manual was a useful document during the project. It evolved logically out of the project Research Design. Presented in this appendix is the final draft of the manual, the last major addition being the chipped stone tool measurement procedures.

CULTURAL MATERIAL PROCESSING

CHECK-IN

The field water-screen team leader brings in material from the field at the end of each day.

The material is sorted into three categories.

1. Complete: completed forms and all bags of material are in the lab.
2. Incomplete: has no form, incomplete forms or part of the Identification Number.
3. Special Samples: all fine screen, pollen, lipid, biosilicate, macrobotanical, perpetuity, and soil samples.

The completed material is placed on the shelves designated for each site. The completed forms that match ID numbers with the completed material are placed in the bottom drawer of a fire proof cabinet. Incomplete forms are placed in a box marked incomplete in the file cabinet.

The next morning the completed ID forms are placed in numerical order. The laboratory assistant completes the ID allotment sheets with all information (see sample allotment sheet, Figure IV.1). Each form is compared to each and every field tag from that ID. The information on all bags must be the same as on the forms. Each tag records the number of bags that belong with that ID number. Example: Bag 1 of 7, Bag 2 of 7, etc.; or Bag 1, Bag 2 with the total number of bags on a tag on the outside of a large sack or a tray that contains all the bags.

If there is no total of bags on a tag, then the person responsible for check-in can look up the field ID in the ID log and see

how many bags are in the ID. All bags must be in the lab for the ID to be complete. After the material is checked one team is assigned to wash. Usually each person on the team will take a different ID. Lab personnel must check with the assistant or the ID log to make sure the number of bags is correct and to record who is washing each ID.

All special samples, except for fine screen and macrobotanical are boxed according to their category and are stored for future study. Fine screen material is usually stored for several days before washing. This is due to the small amount of fine screen and the length of time required to dry the material.

After all the forms and material are checked in, the assistant turns in all field forms which are copied, put in order, punched (three hole standard), and clipped together. The copies for each site go to the Field Director and the originals go to the Lab Director. All original records are stored in fire proof cabinets.

WASHING 0.25 INCH SCREEN RECOVERY

1. When an ID is washed, its provenience on all of the bags from the field must be verified. The bags are counted and each outer tag is checked to make sure that all information is correct.

2. All bags are taken to the washing area. If the bags contain many roots, grass, sticks, etc., it will be necessary to remove them before washing. Rubber gloves are to be worn to avoid contact with poison ivy roots which may be present. Once the inner bag is checked to make sure it matches the outer tag, the material is placed in a large screen. Cloth bags are rinsed and placed in the areas designated for drying.

3. As an adjustment to the amount of material from the sites, mass washing procedures will be employed. This is basically a continuation of the waterscreening process begun in the field. The bags of material are dumped in a washing screen and gently hosed with a fine spray until clean.

4. Empty drying trays are removed from the drying rack and labeled with a properly filled out tag attached to the nail in the tray using the wire on the tag. A second tag should also be placed inside tray and weighed down with a piece of rock or other large artifact. All material is washed, roots discarded, and rocks, pottery, and other archaeological materials placed on a labeled tray. When the bottom of the tray is covered, another tray is used. This procedure is repeated, using as many trays as necessary, until the ID is complete.

5. The number of trays used are counted and the appropriate numbers are recorded on the backs of the tags which have been wired to the trays. For example, if three trays are used, the first is labeled "Tray 1 of 3," the second "Tray 2 of 3," and the third "Tray 3 of 3."

6. All trays are placed in the drying area. Depending on the weather this is the drying rack or the back parking lot. Trays are loaded on racks starting from the top and working down so that wet material does not drip on dry material.

FINE SCREEN RECOVERY

1. An ID from the special samples section is checked out for processing.

2. All of the sample bags for that ID are removed along with as many fine-screen racks from the drier as necessary.

3. Tags from the bag are attached to the nail on the drying rack and the contents of the sample emptied into the screen.

4. The water pressure of the hose nozzle should be adjusted allowing gentle, but sufficient, force to dissolve the dirt. Caution must be exercised to prevent material from splashing out of the tray.

5. Samples are gently washed with care taken to avoid pushing or applying direct pressure with the fingers. This decreases the possibility of inadvertantly crushing any fragile remains in the sample.

6. Cultural materials should be evenly distributed in the tray in order to shorten and unify drying time.

7. A tag is prepared for each side of each tray making sure that all provenience information has been recorded correctly. All trays are counted, with counts recorded on the backs of the tags which have been wired to the trays. For example, if three trays are used, the first is labeled "Tray 1 of 3," the second "Tray 2 of 3," and the third "Tray 3 of 3."

8. For inside drying, the artifact drier should be turned off when racks are loaded. The ON/OFF switch should be taped in the OFF position when not in use to avoid accidents. After all of the material is dry and has been removed from the drier, retape the switch.

9. For outside drying, artifact trays must be covered with cheesecloth to prevent sample contamination or the accidental removal of materials from the trays.

SORTING AND CATALOGING

A basic outline of lab procedures can be summarized as follows:

1. All materials are rough sorted down to the small pieces (see list of rough sorting categories in the following section). The smaller pieces are to be size graded through a 1/2" screen, then rough sorted.

2. All material §1/4" must be examined for chipped stone fragments, microliths, beads, or other artifacts.

3. All material §1/4" is weighed, bagged, and labeled as debris. Sample weight is recorded on the bag.

4. Size grade ceramics through a 1/2" screen and weigh the §1/2" fraction. Bag and label as sherdlets, and record weight on the bag.

5. Sherds ¶1/2" in size are sorted into types by temper and surface treatment. Separate diagnostic sherds (rim, base, podal support, handle, sherd which indicates shape of vessel) from nondiagnostic sherds.

6. Ceramics are recorded on catalog sheets beginning with the latest dating sherds (shell tempered) and continuing through the earliest types (fiber tempered). Ceramic catalog categories are formed on the basis of type and diagnostic or nondiagnostic elements; diagnostic sherds are therefore separated from nondiagnostic sherds of the same type, and are entered on a separate line on the catalog sheet. Standard abbreviations may be used.

7. The sherds in each category are counted and recorded on the catalog sheet. Catalog numbers are assigned, beginning with 1 for each ID and continuing sequentially; one number should be recorded for each sherd.

8. Each ceramic category is weighed and weights recorded on catalog sheets.

9. The catalog number is written (with India ink and quill pen) on each sherd and coated with sealant.

10. All sherds are bagged (one bag per category) in properly labeled bags (see bag labeling format section).

11. Sherdlets, daub, and fired clay are entered on catalog sheets after sherds, along with weights (no count) for each category. Specimen numbers are not assigned to these categories. A 20% sample (by weight) of each category is to be numbered.

12. Modified lithics are sorted into categories. Categories are determined by artifact type and chert type. For example, a Flint Creek point of Heated Camden chert does not go in the same category as a Flint Creek of Ft. Payne chert and receives a separate line on the catalog sheet.

13. Modified lithics are listed on the catalog sheet in the proper order (as listed on the artifact type list in the following section). The number of pieces in each category is numbered and recorded on lab data sheets. Modified lithics are not weighed.

14. Catalog numbers are assigned sequentially, beginning with the number following the last entry assigned to the ceramics.

15. All modified lithics receive catalog numbers (with India ink and quill pen). Numbers should be written on the area of the artifact that is least suitable for photographing. The number is then covered with sealant.

16. All modified lithics are placed in properly labeled bags.

NOTE: Disregard steps 17 and 18 if analysis of debitage is not conducted. All flakes and utilized fired cracked chert (FCC)/Chunks should be weighed as one group. This category is bagged and labeled as "debitage" and recorded on the catalog sheet after debris. Catalog numbers will be assigned.

17. Flakes are size graded through the 1" and 1/2" screens and sorted into 1", 1/2", and 1/4" groups. Each size grade is sorted into categories based on chert type and utilization.

18. Flakes are entered on catalog sheet in order by size, starting with the 1" flakes. The count and weight of each category is recorded. Catalog numbers are assigned, one number for each flake. A 20% sample of the flakes and all utilized flakes is to be numbered by hand.

19. The weight of each introduced rock category is recorded on a catalog sheet. No counts will be made or catalog numbers assigned. A 20% sample (by weight) of each category is to be numbered by hand.

20. The "other" categories (bone, shell, charcoal, historical) are entered on a catalog sheet. Modified bone or shell goes on a

separate line on the sheet. The weight of each catagory is recorded. No counts will be made or catalog numbers assigned.

21. Debris counts and weights are recorded on a catalog sheet. Catalog numbers are not assigned.

22. Insert proper code numbers for each artifact category and raw material type on the lab data sheet.

23. All information on the heading of the catalog sheet is checked and corrected if necessary. All pages are numbered in the space provided, and the sheet is initialed by the analyst.

24. All lab data sheets are turned in to the team leaders at the end of each working day.

25. The team leaders turn in lab data sheets to the data management team for processing.

Rough Sorting Categories

Ceramic: Pottery
Fired clay
Daub

Lithic: Modified
Debitage (flakes)

Introduced Rock: Pebbles/Cobbles
Sandstone
Ferruginous Sandstone
Conglomerate
Limestone
FCC/Chunks
Chalk
FC Quartzite
Unworked Hematite
Unworked Limonite
Unworked Hollow Sandstone Concretion
Siltstone
Galena
Petrified Wood

Other: Bone
Shell
Charcoal
Historic

Sorting Criteria: Ceramics

Introduction

There are two main criteria for sorting ceramics in this stage of analysis: temper type and surface treatment/decoration. Sherd temper is the first characteristic to be noted during analysis. There are seven temper types for the Upper Tombigbee Valley: shell, grog, limestone, fine and coarse sand, and fiber. Sherds are also sorted by surface treatment/decoration within major temper groups. None of the temper and/or surface treatment/decoration categories are discrete. There is a great deal of variability; many of the differences are relative.

Temper Description

Shell: The shell in the Mississippian ceramics leaches out in a lens shape. On the surfaces of ceramics, the shell leaves round, shallow holes. On the edges the shell leaves very thin, flat holes. The shell particles range from coarse to fine. Any shell-like leaching on the surface of the pottery should be noted.

Shell/Grog: When grog is present with shell, the sherd is given the designation shell/grog tempered.

Grog: Grog is composed of crushed sherds/clay and is used as a tempering agent. (Sand may also be present in the sherd, but if grog is present it supercedes sand inclusions.) Grog tempered sherds often have a lumpy, contorted appearance which may be altered by the amount of sand or grog in the paste. The surfaces have a smooth, almost chalky feel and a dull, flat sheen. The edges are irregular. Grog particles vary in size because of differential preparation as a tempering agent. These particles also vary in terms of color. According to Shepard (1964:518), the grog tempered ceramics are recognized by a variety of colors and textures in the sherds and by an irregular, angular particle outline.

Limestone: This temper is recognized by the holes (vesicles) that remain after the limestone leaches out. It differs from shell in that limestone leaves deep, round or angular holes. These sherds are usually heavily tempered, which results in a vesicular appearance.

Bone: The characteristic bone leaching is quite similar to that of limestone. The difference is that bone tempered ceramics are not as heavily tempered as the limestone ceramics. Also, the bone will not totally leach out. The bone present is recognized

as bright and whitish in color. Grog also may be present, but if bone is the overriding temper category the sherd is typed as bone tempered. (Bone is present in many sherds as an occasional fragment). In order to call a sherd bone tempered, bone must be present in 5% of the paste. For purposes of classification, if there are four or more pieces in an average size sherd, the sherd is bone tempered.

Sand: A sand tempered sherd has particles of sand in the paste. The particles range in size from very fine to pebbles/grit. The present analysis does not attempt to distinguish the particle sizes. Sand tempered sherds typically feel rough, and gritty. However, fine sand tempered pottery will have a smooth, almost chalky feeling surface, but will not have grog present. Sand particles can be seen on sherd surfaces and edges (large sand particles will fall our and leave holes). The surfaces of the sherds look somewhat shiny. The edges usually break in straight lines.

Fiber: When a pot tempered with fiber is fired, the organic matter is burned out. This leaves impressions of the fiber channels in the fired clay. There is often sand present in these ceramics in addition to fiber tempering. The later fiber tempered ceramics have more sand than fiber. However, fiber is the temper style recorded on the analysis sheet.

Surface Treatment/Decoration

Once the temper is determined, a sherd is then sorted into a type by surface treatment/decoration. Surface treatment/decoration refers to the manner in which the vessel surface has been altered from the original shaping (e.g., polishing, incising, punctating, etc.).

Sorting Types

Both criteria (temper, surface treatment/decoration) must be determined before the sherd is placed in the final type. Sorting should be conducted only after temper and surface treatment/decoration determinations have been completed. This section has the heading of temper and is further separated into types with a few of the recognizable characteristics noted.

The descriptions of the ceramic types and varieties sorted during the Phase I analysis are presented in Chapter 4.

Computer Categories

VAR 0 Site

VAR 1 ID Number

VAR 60A Ceramic Count

VAR 61A Ceramic Weight

VAR 62A Ceramic Type

Shell Tempered

001 Bell Plain ND
002 Bell Plain D
003 Mississippi Plain ND
004 Mississippi Plain D
005 Decorated Shell ND
006 Decorated Shell D
007 Eroded Shell ND
008 Eroded Shell D
009 Shell/Grog ND
010 Shell/Grog D

Grog Tempered

011 Baytown Plain ND
012 Baytown Plain D
013 Mulberry Creek Cord Marked ND
014 Mulberry Creek Cord Marked D
015 Alligator Incised ND
016 Alligator Incised D
017 Wheeler Check Stamped ND
018 Wheeler Check Stamped D
019 Cormorant Cord Impressed ND
020 Cormorant Cord Impressed D
021 Withers Fabric Marked ND
022 Withers Fabric Marked D
023 Eroded Grog ND
024 Eroded Grog D
025 Grog Other ND
026 Grog Other D

Limestone Tempered

027 Mulberry Creek Plain ND
028 Mulberry Creek Plain D
029 Pickwick Complicated Stamped ND
030 Pickwick Complicated Stamped D
031 Wright Check Stamped ND

032 Wright Check Stamped D
033 Bluff Creek Simple Stamped ND
034 Bluff Creek Simple Stamped D
035 Flint River Cord Marked ND
036 Flint River Cord Marked D
037 Long Branch Fabric Marked ND
038 Long Branch Fabric Marked D
039 Eroded Limestone ND
040 Eroded Limestone D
041 Limestone Other ND
042 Limestone Other D

Bone Tempered

043 Turkey Paw Plain ND
044 Turkey Paw Plain D
045 Turkey Paw Cord Marked ND
046 Turkey Paw Cord Marked D
047 Eroded Bone ND
048 Eroded Bone D
049 Bone Other ND
050 Bone Other D

Sand Tempered

051 Alexander Incised ND
052 Alexander Incised D
053 Alexander Pinched ND
054 Alexander Pinched D
055 Alexander Incised/Pinched ND
056 Alexander Incised/Pinched D
057 Alexander Incised/Punctated ND
058 Alexander Incised/Punctated D
059 Columbus Punctated ND
060 Columbus Punctated D
061 O'Neal Plain ND
062 O'Neal Plain D
063 Smithsonia Zone Stamped ND
064 Smithsonia Zone Stamped D
065 Residual Sand Tempered Plain ND
066 Residual Sand Tempered Plain D
067 Saltillo Fabric Marked ND
068 Saltillo Fabric Marked D
069 Furrs Cord Marked ND
070 Furrs Cord Marked D
071 Eroded Sand ND
072 Eroded Sand D
073 Sand Other ND
074 Sand Other D

Fiber Tempered

075 Wheeler Plain ND
076 Wheeler Plain D
077 Wheeler Dentate Stamped ND
078 Wheeler Dentate Stamped D
079 Wheeler Punctated ND
080 Wheeler Punctated D
081 Wheeler Simple Stamped ND
082 Wheeler Simple Stamped ND
083 Eroded Fiber ND
084 Eroded Fiber D
085 Fiber Other ND
086 Fiber Other D

087 Sherdlets
088 Fired Clay
089 Daub

Sorting Criteria: Lithics

Introduction

The categorization of lithic specimens is generally based on form and raw material. Where possible, the form categories are designed in such way as to imply technology and possibly function. A major goal of categorization is to generate statements regarding artifact manufacture and use. While additional analysis will be required in order to attain an adequate understanding of artifact systems, the present classification scheme provides an initial organization of the data which is amenable to future manipulation.

The presentation of categories in this section follows the code sheets and the order in which specimens are placed on the Field Specimen forms. The descriptions of the artifact categories recognized in the present classification scheme are presented in Chapter 4 of this report.

Computer Categories

VAR 0 Site

VAR 1 ID Number

VAR 63A Lithic Count

VAR 64A Lithic Weight

VAR 65A Lithic Type

01 Projectile Point/Knives
02 Bifaces
03 Preforms
04 Cores
05 Scrapers
06 Drills, Perforators, Etc.
07 Other Uniface and Biface Tools
08 Ground Stone Tools
09 Lithic Debitage
10 Introduced Rock
11 Biotics and Other Materials

VAR 66A Lithic Category

01 Projectile Point/Knives

01 Adena LA
02 Bakers Creek M1-2
03 Beaver Lake EA
04 Benjamin M1-2
05 Benton Barbed LA
06 Benton Extended Stemmed LA
07 Benton Short Stemmed LA
08 Big Sandy EA
09 Bradley Spike M1-2
10 Buzzard Roost Creek LA
11 Camp Creek M1-2
12 Clovis P
13 Collins BM
14 Coosa M1-2
15 Coosa Notched M1-2
16 Copena M1-2
17 Copena Triangular M1-2
18 Cotaco Creek LA
19 Crawford Creek MA
20 Cumberland P
21 Cypress Creek EA
22 Dalton EA
23 Damron EA
24 Ebenezer M1-2
25 Elora LA
26 Eva MA
27 Flint Creek GF
28 Flint River Spike M1-2
29 Gary LA

30 Greenbrier EA
31 Greenville EA
32 Hardaway EA
33 Jack's Reed Corner Notched BM
34 Kay's LA
35 Kirk Corner Notched EA
36 Late Woodland/Mississippian Small Triangular BM
37 Lecroy EA
38 Ledbetter/Pickwick LA
39 Limestone LA
40 Little Bear Creek LA
41 McCorkle Stemmed EA
42 McIntire LA
43 Morrow Mountain MA
44 Morrow Mountain Rounded Base MA
45 Morrow Mountain Straight Stemmed MA
46 Motley LA
47 Mud Creek M1-2
48 Picken's Triangular BM
49 Quad P
50 Residual Stemmed LA
51 St. Alban's EA
52 Stanley EA
53 Swan Lake M1-2
54 Sykes/White Springs MA
55 Tombigbee Stemmed M1-2
56 Vaughn MA
57 Wade LA
58 Unident. PP/K Distal Frag.
59 Unident. PP/K Medial Frag.
60 Unident. PP/K Proximal Frag.
61 Unfinished Small Triangular PP/K BM
62 Residual Side Notched EA
63 Kirk Stemmed EA
64 Big Slough LA
65 Savannah River LA
66 Residual Triangular MA
67 Plevna EA
68 VOID
69 Beachum MA

02 Bifaces

01 Ovoid Biface Blade - Flake
02 Ovoid Biface Blade - Other
03 Triangular Biface Blade - Flake
04 Triangular Biface Blade - Other
05 Narrow Triangular Biface Blade - Flake
06 Narrow Triangular Biface Blade - Other
07 Expanding Triangular Biface Blade - Flake

08 Expanding Triangular Biface Blade - Other
09 Broad Based Triangular Biface Blade - Flake
10 Broad Based Triangular Biface Blade - Other
11 Biface Blade Proximal Fragment
12 Biface Blade Medial Fragment
13 Biface Blade Distal Fragment
14 Biface Other
15 Rehafted Biface Fragment (recycled)

03 Preforms

01 Preform 1 - Cobble
02 Preform 1 - Flake
03 Preform 1 - Indeterminate
04 Preform 2 - Cobble
05 Preform 2 - Flake
06 Preform 2 - Indeterminate
07 Quarry Blade
08 Preform Other

04 Cores

01 90° - Unifacial
02 90° - Bifacial
03 180° - Unifacial Opposing
04 180° - Bifacial Opposing
05 180° - Unifacial Adjacent
06 180° - Bifacial Adjacent
07 270° - Unifacial
08 270° - Bifacial
09 360° - Unifacial
10 360° - Bifacial
11 Bipolar Core
12 Blade Core
13 Microblade Core
14 Core Fragment
15 Core Other

05 Scrapers

01 Uniface side scraper on blade/blade-like flake
02 Uniface end scraper on blade/blade-like flake
03 Uniface side-end scraper on blade/blade-like flake
04 Uniface side scraper on expanding flake
05 Uniface End Scraper on Expanding Flake
06 Uniface Side-End Scraper on Expanding Flake
07 Uniface Side Scraper on Other Flake
08 Uniface End Scraper on Other Flake

09 Uniface Side-End Scraper on Other Flake
10 Uniface End Scraper on Thermal Spall
11 Uniface Side Scraper on Thermal Spall
12 Uniface Side-End Scraper on Thermal Spall
13 Biface Hafted End Scraper
14 Uniface Cobble Scraper
15 Biface Cobble Scraper
16 Scraper on Biface Fragment (recycled)
17 Scraper on Core (recycled)
18 Notched Flake/Spokeshave
19 Unidentifiable Scraper Fragment
20 Scraper Other
21 Ovoid Biface Scraper
22 Biface Scraper on Flake
23 Graver/Scraper
24 Uniface Hafted End Scraper
25 Spokeshave/Biface Side Scraper
26 Notched Flake/Spokeshave (recycled)
27 Ovoid Biface Scraper (recycled)
28 Hafted End Scraper (recycled)

06 Drills, Perforators, Etc.

01 Shaft Drill
02 Expanding Base Drill
03 Stemmed Drill (recycled)
04 Drill Fragment - Distal
05 Drill Fragment - Medial
06 Reamer
07 Perforator
08 Graver
09 Microlith
10 Denticulate
11 Other
12 Micro-Perforator
13 Reamer (recycled)
14 Perforator (recycled)

07 Other Uniface and Biface Tools

01 Uniface Chopper
02 Biface Chopper
03 Uniface Adze
04 Biface Adze
05 Uniface Flake Knife
06 Biface Flake Knife
07 Uniface Cobble Knife
08 Biface Cobble Knife
09 Biface Digging Implement

10 Unidentifiable Chipped Stone Fragment
11 Other
12 Wedge
13 Chipped Axe
14 Chopper/Hammerstone
15 Chisel
16 Burinated Biface (recycled)
17 Adze/Chisel
18 Biface Flake Knife/Spokeshave
19 Biface Knife on Thermal Spall
20 Piece Esquille
21 Piece Esquille on Biface (recycled)

08 Ground Stone Tools

01 Hammerstone
02 Anvilstone
03 Pitted Anvilstone
04 Hammer/Anvilstone
05 Abrader
06 Muller
07 Mortar
08 Pestle
09 Grooved Axe
10 VOID
11 Celt
12 Gorget
13 Atlatl Weight
14 Discoidal
15 Bead
16 VOID
17 Hoe Chip
18 Steatite Sherd
19 Sandstone Sherd
20 Worked Hollow Sandstone Concretion
21 Ground Limonite
22 Ground Hematite
23 Edge Ground Cobble
24 Unident. Ground/Polished Stone Fragment
25 Other (Ground Flake)
26 Muller/Pitted Anvilstone
27 Drill Core
28 Bead Preform
29 Muller/Hammerstone
30 Boatstone
31 Anvilstone/Chopper
32 Ground PP/K
33 Tubular Pipe
34 Abrader/Anvilstone
35 Mortar/Anvilstone

36 VOID
37 Mortar/Pitted Anvilstone
38 Pitted Anvilstone/Abrader
39 Grooved Abrader/Hammerstone/Pitted Anvilstone
40 Awl

09 Lithic Debitage

01 1" Nonutilized
02 1" Utilized
03 1/2" Nonutilized
04 1/2" Utilized
05 1/4" Nonutilized
06 1/4" Utilized
07 Fire Cracked Chert/Chunk - Utilized
08 Prismatic Blade - Nonutilized
09 Prismatic Blade - Utilized
10 Other
*11 1" Cortical Nonutilized
*12 1" Cortical Utilized
*13 1/2" Cortical Nonutilized
*14 1/2" Cortical Utilized
*15 1/4" Cortical Nonutilized
*16 1/4" Cortical Utilized
17 Blade-like Flake - Nonutilized
18 Blade-like Flake - Utilized

10 Introduced Rock

01 Conglomerate
02 Chalk
03 Limestone
04 Unmodified Cobbles/Pebbles
05 Nonutilized Fire Cracked Chert/Chunks
06 Galena
07 Quartzite
08 Ferruginous
09 Sandstone
10 Petrified Wood
11 Hematite
12 Limonite
13 Unworked Hollow Sandstone Concretions
14 Siltstone
15 Slag
16 Crinoids
17 Fossils
18 VOID
19 Clay Balls (This does not apply to regular fired clay.)
20 Quartz

21 Graphite
22 Ochre
243 Anthracite
24 Manganese Nodules
25 Unidentified
26 Steatite

11 Biotics and Other Materials

01 Unmodified Bone
02 Modified Bone
03 Charcoal
04 Historic
05 Debris
06 Other (Shell)
*07 Debris - 1/4" Debitage
*08 Debris - 1/4" Introduced Rock
*09 Debris - 1/4" Bone
*10 Debris - 1/4" Ceramics
*11 Debris - 1/4" Unidentifiable Chipped Stone Frag.

*Note: Categories 7-11 apply to plotted specimens only.

VAR 67A Raw Material

01 Heat-Treated Tuscaloosa Gravel
02 Yellow chert (unheated Tuscaloosa Gravel)
03 Heat-Treated Camden
04 Unheated Camden
05 Fossiliferous Bangor
06 Blue-Green Bangor
07 Little Mountain Bangor
08 Fort Payne
09 Fossiliferous Fort Payne
10 Tallahatta Quartzite
11 Coastal Plain Agate
12 Quartz
13 Quartzite
14 White chert
15 Pickwick
16 Novaculite
17 Cumberland
18 Sandstone
19 Ferruginous Sandstone
20 Conglomerate
21 Limonite
22 Hematite
23 Siltstone
24 Greenstone

25 Steatite
26 Shale
27 Unidentified
28 Petrified Wood
29 Jasper
30 Galena
31 Chalcedony
32 Oolitic chert
33 Flint Ridge
34 Schist
35 Ochre
36 Anthracite
37 Gray Buffalo River

Standard Abbreviations

Adjacent - ADJ
Alexander - ALEX
Anvilstone - ANV

Bangor, Blue-Green - BG BAN
Bangor, Fossiliferous - FOS BAN
Bangor, Little Mountain - L M BAN
Barbed - BARB
Biface - BIF
Blade - BLD
Blade/Blade-like - B/B LIKE

Camden, Heated - HT CAM
Camden, Unheated - U CAM
Check - CHK
Chipped - CHP
Coastal Plain Agate - CPA
Chopper - CHOP
Cobble - COB
Complicated - COM
Concretion - CONC
Conglomerate - CONG
Cord - CD
Corner - COR
Creek - CK

Decorated - DECOR
Digging - DIG
Discoidal - DISC
Distal - DIS

Eroded - ERD
Expanding - EXP
Extended - EXT

Fabric - FB
Ferruginous Sandstone - FESS
Fire Cracked Chert/Chunks - FCC/CH
Flake - FLK
Fragment - FRAG
Ft. Payne, Blue-Gray - FT P
Ft. Payne, Fossiliferous - FOS FT P

Greenstone - GRST
Grooved - GROV
Ground - GR

Hafted - HAF
Hammerstone - HAMS
Hematite - HEM
Hollow - HOL

Identification - ID
Incised - INC
Indeterminate - IND
Implement - IMPL
Impressed - IMPR

Limonite - LIM

Marked - MK
Medial - MED
Mississippi - MISS
Mountain - MT
Mulberry - MULB

Narrow - NAR
Notched - NOT
Novaculite - NOV

Opposing - OPP

Perforator - PERF
Pickwick - PW
Pinched - PIN
Pitted Anvilstone - PIT ANV
Proximal - PROX
Punctated - PUN

Quartz - QZ
Quartzite - QZTE

Residual - RES

Sandstone - SS

Scraper - SCR
Siltstone - SILT
Simple - SIM
Spokeshave - SPOK
Stamped - STP
Steatite - STE
Stemmed - STM
Stone - STO
Straight - STRG
Sykes/White Springs - SYK/WS

Tallahatta Quartzite - TALL
Tombigbee - TOMBB
Triangular - TRI
Tuscaloosa Gravel, Heated - HT TUS
Tuscaloosa Gravel, Unheated - U YEL C

Unidentifiable/Unidentified - UNID
Uniface - UFA
Utilized - UT

White chert - WC
Worked - WK

BAGGING

The following procedures for curation have been established to maintain the integrity of the collection at the highest level of classification (Phase I), to facilitate access to the specimens, and to assure protection of material collections.

Bagging procedures can be summarized as follows:

1. All information from the field provenience tag is recorded on the bag or envelope.

2. Artifacts not cataloged due to small size are placed in labeled vials, plastic bags, or coin envelopes. These containers are placed in another plastic bag with a tag. A third tag is attached to the outside bag or the plastic bag and the remaining sample is placed in a labeled paper bag. An exception occurs when samples consist of pieces to the sample. In this case, a coin envelope marked with a tag inside and labeled on the outside will suffice.

3. The 20% of debitage samples that is cataloged follows the procedure outlined above. However, if there is only a small sample, a tag inside the coin envelope is unnecessary.

4. Fragile artifacts not made of wood (e.g., ground bone, polished stone beads, awls, seed beads, etc.) are wrapped in cotton and placed in a labeled vial, enclosed by a coin envelope with identical provenience information. The outer wrapping is marked "Fragile." If the object is too large for storage in a vial, the piece should be wrapped accordingly and a completed tag attached. The artifact is then placed in a plastic bag inside of the paper bag (if the outer bag can be labeled, the inside tag is not required).

Ceramics

1. All ceramics of diagnostic forms (rim, lips, bases) are separated from nondiagnostic forms (body sherds) within each temper type.

2. All varieties of shell, grog, limestone, and bone tempered ceramics are bagged according to temper and whether they are diagnostic or not.

3. Sand tempered pottery is further divided into Miller, Alexander,Residual, and Eroded (still keeping diagnostic and nondiagnostic separate). These categories are bagged following the same procedure outlined above. Miller ceramics include:

a. Saltillo Fabric Marked D, ND
b. Furrs Cord Marked D, ND

Alexander ceramics include:

a. Alexander Incised D, ND
b. Alexander Pinched D, ND
c. Alexander Incised/Pinched D, ND
d. Alexander Incised/Punctated D, ND
e. Columbus Punctated D, ND
f. O'Neal Plain D
g. Smithsonia Zone Stamped D, ND

4. Fiber tempered ceramics are bagged as described in number 2. All fiber temper types are bagged together. However, eroded fiber sherds are labeled "Eroded Fiber", not "Wheeler."

5. Sherdlets, fired clay, and daub are bagged individually.

6. "Other" most temper types include this category. This category is always bagged separately. Diagnostic and nondiagnostic sherds are indicated on the envelopes but may be placed in a larger bag together.

7. The procedure for bagging reconstructable sherds and vessels is as follows:

a. Catalog each piece with the ID number, site number, etc.

b. Reconstruct vessel fragments when possible.

c. Glue sherds together carefully taking caution to wipe off any excess glue while pieces are wet.

d. If sherds from <u>Different</u> IDs fit together, all pieces should be checked for catalog numbers prior to reconstruction.

e. Envelope(s) and catalog sheet(s) should be prepared for each ID, even though some may be empty.

f. The artifact bearing IDs associated with a P.S. or general level are noted under comments on the catalog sheets. The ID number on the bag that contains the reconstructed sherds should be noted on the catalog sheet. Indicate under which ID the artifacts are packaged.

g. The field tag is placed in a completed envelope with a note indicating where to find the sherd(s) that have been glued to others from a different ID number.

h. The reconstructed vessel should have <u>all</u> the IDs and associated information on the outside of the box that will be stored for future reference.

i. The box is packed with cotton.

j. All sherds (even from different IDs) that appear to be from a single vessel should be noted on the catalog sheet, but bagged separately.

k. A list of all IDs that fit together and/or are associated is prepared and cross-checked by a team leader.

<u>Lithics</u>

The same general procedures employed for bagging ceramics apply to the lithic categories.

1. Place diagnostic PP/Ks from one ID into separate coin envelopes and combine them into a larger bag that is labeled with all provenience information and the final count.

2. PP/K Proximal, Medial, and Distal fragment categories are bagged separately.

3. Bifaces, preforms, scrapers, cores, drill, other uniface/biface tools, and ground stone tools are bagged by the categories used in coding. The bagging of debitage and introduced rock samples also follows this procedure. Fragments of the tools are separated (e.g., unidentified chipped and ground stone fragments).

4. Bone and charcoal are bagged separately.

5. All historic material is bagged together in the initial analysis. This material will be separated following further analysis at a later date.

<u>Bag Labeling Format</u>

Site No.__________________________________

Prov. Unit________________________________

Level_____________________________________

ID Nos____________________________________

Category__________________________________

Count__________________Wt________________

By______________________Date______________

BOXING

After all materials are properly bagged, they are placed in the appropriate "To Be Boxed" carton. Lithic implements are then turned over to the measurement team which will be responsible for curation. One or two persons are responsible for final boxing of the remaining artifacts.

Each artifact category is boxed in ID sequence as follows:

1. The box is lined with a plastic garbage bag for large artifacts or subdivided with heavy strength plastic bags - one per category.

2. Into each plastic bag a label is placed and includes: site number, category, ID sequence, and code numbers.

3. The bag is tied with an identical tag.

4. The sequence of IDs in each bag is checked to insure that all IDs are present before final storage.

5. All ceramics except Miller and Alexander are boxed by "Type." The "Other" category from appropriate temper types is contained in one box but is subdivided with plastic bags, or baggies, by temper type.

6. All modified lithics are bagged according to the categories used in coding.

7. All historic material is boxed together after subdivision into ceramic, glass, metal, and miscellaneous categories.

8. The categories included in a box vary according to the sample size. All boxes should be clearly labeled with the site number, contents, and IDs represented. The contents of each box should allow enough room for the proper lid closure.

9. Boxing Categories

Ceramics

1. Shell Tempered
2. Grog Tempered
3. Bone Tempered
4. Limestone Tempered
5. Sand Tempered - Miller
6. Sand Tempered - Alexander
7. Fiber Tempered
8. Ceramic - Others
9. Sherdlets
10. Fired Clay and Daub

Lithics

1. Projectile Point/Knives
2. Bifaces
3. Preforms
4. Cores
5. Scrapers

6. Drills, Perforators, Etc.
7. Other Uniface and Biface Tools
8. Ground Stone Tools
9. Lithic Debitage
10. Introduced Rock
11. Bone
12. Charcoal
13. Historic
14. Debris
15. Biotic - Other
16. Macrobotanical 1/4" Material

METRIC MEASUREMENT

TOOL MEASUREMENT: GENERAL PROCEDURE

Introduction

Eight people, four from each lab, will measure the tools for their labs. Two people from each lab will work on PP/Ks, two will work on other tools. The tool categories used in measurement will conform to the boxing categories.

Storage Check-Out

To keep track of who has what, measurers must record the boxes they remove from storage in either lab on the check-out form. Boxes are identified by category and first and last ID number. Artifacts from sites undergoing analysis will be measured first each day. Backlog will be worked on after the tools from the previous day's analysis have been measured.

Code Sheet

Code sheets will be filled out by boxing category (see Figure IV.2). That is, there will be a code sheet for bifaces and one for preforms. ID numbers will run sequentially on the code sheet. Catalog numbers must be accurate, as they will be used in the computer to identify the measurements for each tool.

The box marked "Quality" should be checked if any measurement for a tool is measureable but in some way suspect. For instance, shoulder width may be measureable on a resharpened shoulder, but the measurement would not be representative of that point type. "Description," "Type," "Category," and "Raw Material," with the

exception of recycled tools, need only be copied from the original information.

The individual measurements are described individually in the following section. Note, however, that on this code sheet a slash represents an unmeasureable attribute and cannot be used in place of a zero. Each box should be filled in with either a measurement, a slash if unmeasureable, or a dot if a measurement for that tool type is not applicable for that particular category (as in shoulder width for Late Woodland-Mississippian Traingular PP/Ks). If a measurement does not apply to a particular tool type (as in juncture width for scrapers), that space should be left blank.

Corrections

We are not conducting reanalysis. If a tool identification is grossly in error (a uniface scraper identified as a biface core) it must be corrected, but if the identification was open to dispute the first time, there is no need to discuss it again.

However, the recycled tool categories that we use now were not in use when the earlier material was analyzed. Tools that would have been placed in these categories, had they been available, must be placed in them now.

Use the Lab Data File Correction Form (Figure IV.3) to record changes in artifact identification. Enter the old information on the "From" line, and the new information on the "To" line. For both the "From" and "To" lines, the verbal description should be entered first, then the numeric description.

If an artifact requires a change of description or coding which will not affect any of the other categories for that ID, the correction may be made with only one change.

If an artifact requires a change of description or coding which will affect one of the other categories, all necessary changes should be made.

For example, if a core fragment has been re-identified as a 1/2" flake of Heated Camden, a correction should first be made to the information for the core fragment category, then a correction should be made to the 1/2" flake, Heated Camden category.

If there were no other core fragments, then the information from that category should be deleted.

After the proper information has been entered on the correction sheet, the field Specimen/Code Sheet and the artifact's bag should be corrected.

Corrections should be initialed. All correction sheets should be dated.

Correction sheets for each tool type should be kept with the measurement sheets for each site. They will be turned over to the keypunchers together.

All changes should be approved by the appropriate lab's Director or Assistant.

PROJECTILE POINT/KNIFE MEASUREMENT

Terminology

Introduction

The following methods for orienting, describing, and measuring projectile point/knives are drawn from Futato (1977). That system has been adapted to include flake tools and non-symmetrical tools. These adaptations are described in the next section.

Orientation

PP/Ks are considered symmetrical to facilitate measurement. Treating PP/Ks as symmetrical allows measurements to be defined as distances between planes parallel of perpendicular to the midline.

The following terms provide an orientation for PP/Ks and define the parts of the tool.

Vertex - A point at the intersection of two lines.

Margin - The maximum linear boundary of a projectile point.

Edge - Any portion of the margin.

Coronal - The plane which includes the margin.

Longitudinal - The plane perpendicular to the coronal which is the boundary of isomorphic parts of the projectile point.

Midline - The intersection of coronal and longitudinal planes.

Transverse - Any plane perpendicular to the midline at only one point.

Side - Either of two portions of the projectile point bounded by the longitudinal plane.

Face - Either of the two portions of the projectile point bounded by the coronal plane.

*Proximal - At a greater distance from the tip along the midline.

*Distal - At a lesser distance from the tip along the midline.

Medial - At a lesser distance from the midline.

Lateral - At a greater distance from the midline.

*Note that Proximal and Distal are relative to the tip along the midline, not around the margin.

Projectile Point/Knife Parts

These terms are used to define specific edges and points on PP/Ks and to divide them into blade and haft elements.

Midbase - The proximal intersection of midline and margin.

Base - Any edge beginning at the midbase and ending at the most lateral paired points on the margin not beyond the first vertex in either direction.

Basal - the most proximal transverse plane tangent to the base.

Junctures - The paired, most distal points on the edge beginning at the most medial vertices not on the basal plane and ending at the next vertex on the margin moving initially toward the proximal end of the milline.

This definition of junctures can be simplified by breaking it into two cases.

1. For points which are not basally modified, the junctures are the most medial paired vertices not on the base.

2. For basally modified points, the junctures are located at the top of the notches which form the haft element modification.

Haft Element - Any portion of the projectile point proximal to a straight line segment beginning at one juncture and ending at the other.

Blade Element - All non-haft portions of the projectile point.

Blade Edge - The portion of the margin beginning at the tip and ending at the first encountered of: the most proximal and lateral vertex on the blade element other than the juncture; the juncture; or the base.

Shoulder - Any non-base edge extending medially from the proximal end of the blade edge and not ending proximally on the basal plane.

Lateral Haft Element Edge - Any non-base, non-shoulder, margin on the haft element.

Haft Modification

Modifications to the haft element are lateral, basal, or diagonal.

Haft Modification - Any edge between points on the margin lying on a plane perpendicular to the coronal and tangent to the projectile point at the lateral end of one shoulder and the haft element, not including the midbase; or tangent to the projectile point at the lateral end of both shoulders.

Laterally Modified Haft - Any projectile point having the ends of the haft modification on two planes either not tangent to the base or tangent to the base but not intersecting proximal to the junctures.

Basally Modified Haft - Any projectile point having the ends of haft modification on a plane tangent to the projectile point at the lateral end of the shoulders.

Diagonally Modified Haft - Any shouldered projectile point not laterally or basally modified.

Unmodified Haft - Any projectile point having a haft element and no shoulder.

Measurement

The following seven measurements are taken for all intact stemmed points; the first apply to the blade, the last two measure the haft. Only the first four measurements are applicable to triangular points. The application of the definitions in actual measurement is treated in detail in the next section.

1. Maximum Length - Maximum perpendicular distance between transverse planes tangent to the projectile point.

2. Maximum Width - Maximum perpendicular distance between planes parallel to the longitudinal plane and tangent to paired points on the projectile point.

3. Maximum Thickness - Maximum perpendicular distance between planes parallel to the coronal plane and tangent to paired points on the projectile point.

4. Basal Width - Distance on the coronal plane between ends of the base.

5. Shoulder Width - Distance on the coronal plane between lateral ends of shoulders.

6. Juncture Width - Distance on the coronal plane between junctures.

7. Haft Element Length - Perpendicular distance between the basal plane and the transverse plane which includes the junctures.

NON-PROJECTILE POINT/KNIFE TOOL MEASUREMENT

Orientation

Modified lithic artifacts, other than PP/Ks are measured for length, width, thickness, and weight. Weight for all artifacts is simply the total mass of the artifact in grams, to the nearest tenth of a gram. Length, width, and thickness are similar for

all artifacts, but orientation varies. Orientation depends on tool morphology.

Symmetrical Tools

If the tool is symmetrical, as are PP/Ks, then measurements are defined on the basis of distances between planes parallel or perpendicular to the midline. The definitions below are generalized forms of the ones used with PP/Ks and are used for all symmetrical tools.

Maximum Length - Maximum perpendicular distance between transverse planes tangent to a tool.

Maximum Width - Maximum perpendicular distance between planes parallel to the longitudinal and tangent to paired points on the tool.

Maximum Thickness - Maximum perpendicular distance between planes parallel to the coronal and tangent to paired points on the tool.

Flake Blank Orientation

Tools which are not symmetrical, but do show flake morphology, are oriented with the bulbar axis.

Maximum Length - Maximum perpendicular distance between two planes perpendicular to the bulbar axis and tangent to the artifact.

Maximum Width - Maximum perpendicular distance between two planes parallel to the bulbar axis and tangent to the tool.

Maximum Thickness - Maximum perpendicular distance between two planes parallel to the bulbar axis, perpendicular to the planes defining the maximum width, and tangent to the tool.

Absolute Dimensions

Tools showing no original flake blank orientation, or presenting asymmetry as in heat spall scrapers, are measured according to absolute length, width, and thickness.

Maximum Length - Maximum perpendicular distance between two parallel planes tangent to the tool.

Maximum Width - Maximum perpendicular distance between two parallel planes tangent to the tool and perpendicular to the planes defining the length.

Maximum Thickness - Maximum perpendicular distance between two parallel planes tangent to the tool and perpendicular to both the planes defining the length and those defining the width.

If a tool shows symmetry, it should be oriented by the method for symmetrical tools, even if it also has recognizable flake characteristics.

Special Measurements

Certain other measurements are taken on specific categories of tools.

Expanding Triangular Biface Blades

Expanding triangular biface blades are thinned, triangular bifaces with two blade edges and a base. The edges are always excurvate such that the distance from the base to the widest part is greater than the maximum width. Element length is measured for these tools.

Element Length - Maximum perpendicular distance between the basal plane and the line defining the maximum width for the artifact.

Broad Based Triangular Biface Blades

Broad based triangular biface blades are similar to other triangular biface blades except that the basal width is about 65 percent of the length. Basal width is measured for these artifacts in the same way as for PP/Ks.

Basal Width - Distance on the coronal plane between ends of the base.

Beads, Atlatl Weights, and Gorgets

All of these tools may possess drilled perforations. The maximum interior diameter of all perforations on the artifact should be measured.

Nonprojectile Point/Knife Chipped Stone Tool Measurement

Biface Blades

There are essentially two kinds of biface blades,ovoid and triangular. Triangular biface blades are further divided into: triangular biface blades, narrow triangular biface blades, broad based triangular biface blades, and expanding triangular biface blades.

Weight, length, width, and thickness are measured for all of these. Additionally, there are special measurements for broad based triangular biface blades and expanding triangular angular biface blades. These measurements are defining attributes of these tools. If the measurements do not meet the requirements of the definition, the tool should be placed in the correct category.

Ovoid Biface Blades

A thinned, retouched ovoid biface. Edges are regular and unflaked surfaces are rare. The margin is a single edge segment; there are no separate basal edges.

Triangular Biface Blades

A thinned, retouched, triangular biface with two blade edges and a base. The edges are usually straight to parallel, excurvate or incurvate. The base is usually straight to excurvate. The base is ordinarily the maximum width; about 25 to 30 percent of the length.

Narrow Triangular Biface Blades

Similar to triangular biface blades except that the basal width is only about ten percent of the length.

Expanding Triangular Biface Blades

Expanding triangular biface blades are thinned, triangular bifaces with two blade edges and a base. The edges are always excurvate such that the distance from the base to the widest part is greater than the maximum width. Element length is measured for these tools.

> Element Length - Maximum perpendicular distance between the basal plane and the line defining the maximum width for the artifact.

This measurement should be placed in column number four (4) of the measurement code sheet.

Broad Based Triangular Biface Blades

Broad based triangular biface blades are similar to other triangular biface blades except that the basal width is about 65 percent of the length. Basal width is measured for these artifacts in the same way as for PP/Ks.

> Basal Width - Distance on the coronal plane between ends of the base.

This measurement should be placed in column number four (4) of the measurement code sheet.

Preforms

Preforms only require measurement of weight, length, width, and thickness.

Cores

Cores should be measured for weight, length, width, and thickness. In most cases, these measurements will be made with the tool oriented by absolute dimensions, rather than flake morphology or symmetry. All core categories except "Core Fragments" (0414) should be measured.

Scrapers

Scrapers must also be measured for weight, length, width, and thickness. Scrapers identified as made on a flake are oriented by flake morphology. Most other scrapers should be oriented by absolute dimensions. Some, however, such as hafted end scrapers, may be measured as symmetrical tools.

A scraper should be measured as a whole tool if no breaks intersect the scraper edge. If a break does intersect the scraper edge, the tool should be considered a fragment, and the measurements restricted as needed.

All scraper categories except "Unident Scraper Fragments" (0519) should be measured.

Drills, Perforators, etc.

Tools included in this type possess one or more manufactured projections. The categories are:

- Drills
    - Shaft drills
    - Expanding base drills
    - Stemmed drills (recycled)
- Reamers (nonrecycled and recycled)
- Perforators (nonrecycled and recycled)
- Gravers
- Microliths
- Denticulates
- Micro-perforators

Weight, length, width, and thickness should be measured for all tools under Drills, Perforators, etc.

Drills should be measured as symmetrical tools. Other categories should be measured by either flake-blank or absolute orientation, depending on the presence or absence of flake morphology.

Tools that are not completely worked should be considered whole as long as no break intersects the modification. For tools that are recycled, this rule should be applied only to the reworked surfaces.

All tool categories under this type should be measured except "Drill Fragment - Distal" (0604) and "Drill Fragment - Medial" (0605).

Other Uniface and Biface Tools

A complete list of tools included in this type is located in the Lithic Category tab.

Weight, length, width, and thickness should be measured for all tools under Other Uniface and Biface Tools.

Most tools in this type will not be symmetrical. If possible, flake blank orientation should be used on non-symmetrical tools. Otherwise, absoluted orientation should be used.

All categories under this tool tvpe should be measured, except "Unidentifiable Chipped Stone Fragments" (0710).

Ground Stone Tools

Ground stone tools should be measured for weight, length, width, and thickness.

Tools under this category may be oriented by symmetry, flake blank orientation, or absolute dimensions. In addition, "Atlatl Weights," "Beads," "Tubular Pipes," and "Bead Preforms" that possess a drilled perforation through their center should be oriented with the axis of the perforation as the axis of length.

Drill Holes

All drilled perforations should be measured for maximum interior diameter. Drilled perforations may occur in tools categorized under "Gorget," "Atlatl Weight," "Bead," "Bead Preform," and "Tubular Pipe."

This measurement should be placed in column number four on the measurement code sheet.

All tool categories under this type should be measured except: Hoe Chip (0817), Steatite Sherds (0818), Sandstone Sherds (0819), Ground Limonite (0821), Ground Hematite (0822), Unidentifiable Ground Stone Fragment (0824), and Other (Ground Flake) (0825).

Ground flakes in this category should not be measured. Any other tools in this category should be measured.

CODE LIST FOR TOOLS THAT WERE NOT MEASURED

01 Projectile Point/Knives

- 58 Unident. PP/K Distal Frag.
- 59 Unident. PP/K Medial Frag.
- 60 Unident. PP/K Proximal Frag.

02 Bifaces

- 11 Biface Blade Proximal Fragment
- 12 Biface Blade Medial Fragment
- 13 Biface Blade Distal Fragment

04 Cores

- 14 Core Fragment

05 Scrapers

- 19 Unidentifiable Scraper Fragment

06 Drills, Perforators, Etc.

- 04 Drill Fragment - Distal
- 05 Drill Fragment - Medial

08 Ground Stone Tools

- 17 Hoe Chip
- 18 Steatite Sherd
- 19 Sandstone Sherd
- 20 Worked Hollow Sandstone Concretion
- 21 Ground Limonite
- 22 Ground Hematite
- 24 Unident. Ground/Polished Stone Fragment

Figure IV.1

Identification Number Allotment Sheet

SITE 22 I.D. ALLOTTMENT SHEETS DATE________ PAGE____

I.D.#	PROVENIENCE	CATEGORY	BAG#	WASHER	TRAY#	ANALYSOR	FINISHED	COMMENTS

Figure IV.2

Artifact Measurement Form

UNIVERSITY OF WEST FLORIDA
OFFICE OF ARCHAEOLOGICAL CONTRACTING
ARTIFACT MEASUREMENT FORM

Page ______ Of ______
ID No. ______ Thru ______
Recorder ______
Date ______

Site Number *

LITHICS

ID NUMBER	CAT NUMBER	QUALITY	DESCRIPTION	CAT	RM	WEIGHT IN GRAMS	MEASUREMENTS								
							LEN	WID	THK	4	5	6	7	8	9

Figure IV.3

Corrections to Measuremnt Data File Form

UNIVERSITY OF WEST FLORIDA
OFFICE OF ARCHAEOLOGICAL CONTRACTING
ARTIFACT MEASUREMENT

CORRECTIONS TO DATA FILE

Page ______

Recorder ______

Date ______

Site Number *

LITHICS

	ID NUMBER	CAT NUMBER	QUALITY	DESCRIPTION	TP	CAT	RM	WEIGHT IN GRAMS	MEASUREMENTS				
									LEN	WID	THK	4	5
FROM													
TO													
FROM													
TO													
FF													
TO													
FROM													
TO													

APPENDIX V

FIELD MANUAL FOR THE FIRST PHASE OF DATA RECOVERY

by

Joseph M. Studer

INTRODUCTION

This document presents a detailed and explicit description of all field prodedures practiced during the first phase of data recovery on this project. This phase included testing seven sites and large scale excavation of four sites. These efforts began in January 1980 and were completed in March 1981. Two to five sites were investigated simultaneously by a total of appoximately 150 persons. Over a million specimens have been recovered.

The orientation of this manual is to the professional archaeologist or the student archaeologist. It is hoped that such a person could take this document and, having studied it, join the project while in full swing. Of course this final version has evolved throughout the course of two years, and now refers to a past entity. However, the present verb tense in the text has been maintained throughout to keep the "instructional" or manual orientation.

The organization of this manual is from general to specific. The overall strategy is first discussed. Then the basic control methods are described. In the Excavation section the basic units and divisions are introduced. Then the methods for unit placement are fully discussed, the standard procedures for levels and features are described, and the testing procedures are presented. The special samples taken by the project are explained. The final section deals with the field forms used during data recovery. These forms are described in detail and some form evolution is presented.

This field manual is almost textbook-like due to the scope and level of detail. This is almost fitting as many different circumstances were encountered and had to be dealt with in a standardized manner.

STRATEGY

The present project is a portion of the cultural resource management program of the Tennessee-Tombigbee Waterway. As such, there is a need for the data retrieved to be compatible throughout the Waterway. In a long-term multi-site project such as this, the procedures employed need to be standardized to insure internal comparability.

The different projects mitigating the cultural resources of the Upper Tombigbee River are diverse in their areas of concern and, of necessity, differ in the approaches used. The government has set minimum standards for field data recovery forms so as to maintain a minimal level of information and compatibility. The

field data forms for this project were designed incorporating the experience of the project staff, the basic government standards, and forms from other archaeological projects. The project forms are reviewed in detail later in this appendix.

The field strategy and procedures of this project have developed in a pragmatic fashion. Considerable planning preceeded actual fieldwork. In the planning stage, the Fall of 1979, it was recognized that the physical realities of the sites and unforeseen circumstances would necessitate continual changes. The structure of the recorded data was designed to accommodate changes. The need for a data structure which could remain stable through changes of strategy and procedure was important because of the need to use computers as data management and manipulative tools. The field strategy designed had to maximize the data retrieval and be consistant with the project research objectives. At the same time the strategy must be flexible enough to allow the most thorough excavation possible of the individual sites.

EXPECTATIONS

The complexity of the sites, in terms of dispositional history and intrasite cultural associations, was apparent from the Upper Tombigbee Valley testing data (Supplement 1 and Bense 1979 a, b, c), and investigations at similar sites (Galm 1978 a, b, c). Testing indicated that the sites contained visually identifiable, but not necessarily distinct, stratigraphy. Cultural components should be differentially distributed, vertically and horizontally, through the sites. Mixing of components and blurring of physical boundaries was expected. Excavation controls were designed to allow separation of components during analysis.

Features were expected to provide identifiable component definitions. Burned clay and soil areas, remains of hearths and possible living surfaces, were anticipated. Pit features of various sizes and shapes were expected to be the most informative in terms of subsistance activities, but bioturbation was expected to complicate their definition.

PROVENIENCE CONTROL

The metric system of measurement is employed on all project excavations.

GRID PLACEMENT

A horizontal Cartesian grid is arbitrarily established with the 0-0 point of the grid to the northeast of the site. This places the entire site in the southwest quadrant of the grid. A horizontal benchmark is set on the site and given arbitrary coordinates (e.g. 100S/100W). This point will then be used to establish a physical grid on the site. Baselines and grid stakes are set out to aid in mapping the site, placing cores, and establishing excavation units. All units are designated by the coordinates of their northeast corner.

The site grid is oriented with magnetic north unless the topography or surface features of the site make the establishment of an arbitrary grid north more efficient for sampling or excavations. If a grid north base line is established, magnetic north is indicated on the site maps.

VERTICAL CONTROL

At least one benchmark with a known or an arbitrary elevation is established on each site. If an arbitrary datum is used it is set at 100 m. All benchmarks with arbitrary elevations are eventually tied to benchmarks with known elevations if reasonably possible.

Vertical control of the excavations and topographic mapping of the site is based on the main benchmark. Additional benchmarks are established on the site as dictated by need. Excavations will be determined through use of a transit or builder's level and leveling rod. Elevations are generally recorded to the nearest centimeter.

TOPOGRAPHIC MAPS

Each site has a topographic map drawn indicating modern surface features and adjacent physiographic features. The contour interval used is determined by the topography of the site.

PHOTOGRAPHIC CONTROL

Photo documentation includes both color slides and black and white prints. A log of the photographs is maintained as they are taken (see form section). Frame number, date of exposure, camera settings, direction of exposure, photographer, and a description

of the photograph are recoreded in the photo log at the time of exposure. A photo number, which is sequential for the site, is added to the log after the film is processed.

The black and white photographs are placed in a file according to photo number and in a cross-reference file according to subject class (e.g. features, profiles). The file cards contain a contact print of the photo, the photo number, and the field information. Black and white negatives and color slides are stored in plastic loose leaf sheets according to photo number. A cross-reference file of color slides is maintained.

Formal photographs of features, profiles, and the like, contain a menu board with the site number, and a description of the subject and its provenience. Formal excavation photographs should show clean excavations. Photography is used to document all stages of excavation as well as procedures and techniques utilized. General site and environmental photographs are also taken.

IDENTIFICATION NUMBERS

Identification numbers (ID) are used as handles for cultural material and their provenience. ID numbers are dispensed at the site. Each unit of excavation for which separate analysis is desired is given a unique ID number. A list of sequential numbers is maintained in a field log for each site. One central log is kept on each site so that all ID numbers assigned will be unique. A Field Provenience form or a Special Sample form is used for each ID number (see form section for examples).

MASTER ID NUMBERS

Basic units of excavations often need to be subdivided. The basic excavation unit is usually a feature or a 2 by 2 m square dug in 10 cm levels. However, sometimes a smaller unit is needed. Therefore, a Master ID is assigned and subdivisions of the main units, such as halves, quadrants, segments, plotted specimens, or other special samples, are assigned their own unique ID number which is referenced to the appropriate Master ID. This "nesting" of ID numbers under a Master ID allows the data to be retrieved from the "nest" individually or collectively. Only one Master ID is assigned to each basic unit. Master ID numbers cannot be nested within other Master IDs. A Master ID is not assigned to blocks of or numerous levels of 2 by 2 m units.

WATERSCREENING

All material removed from controlled excavations, except special samples, is screened through 0.25 inch mesh hardware cloth. This is accomplished most efficiently by using water to wash the dirt through the screens. This method is used unless no water is available in which case small shaker sceens are used.

The dirt can be placed directly into the screens and washed through, or placed in a trough where water is added to the dirt and the resulting slurry is washed through the screen. The use of a trough allows numerous wheelbarrow loads of dirt with a single ID number to be processed at once. If the excavated dirt is to be finescreened (0.06 inch mesh), a finescreen is simply placed under the 0.25 inch screen. This allows the 0.25 inch and finescreen fractions to be collected separately.

Gasoline powered engines, 6 to 7 hp, with 3 inch centrifugal pumps are generally used to supply water to the screening operation. The water flow is routed to the screens through a series of fire hoses.

EXCAVATION

The basic units of excavation on the project are arbitrary 2 by 2 m squares and features. The 2 by 2 m size is convenient to work in and is easily divided or multiplied. Vertical subdivision is usually achieved through the use of 10 cm levels. Where possible natural strata are used in excavation. Feature excavations supersede general unit designations and are investigated as separate entities. More detailed descriptions of individual excavation procedures follow.

GENERAL EXCAVATION UNITS

The majority of the project general horizontal excavation units are 2 by 2 m squares. They are most often grouped in blocks creating large excavation units. These larger excavation blocks are given letter designations for convenience.

Excavations showed, as was suggested during testing, that strata boundaries are difficult or impossible to identify and follow in horizontal excavations. Where feasible the excavations were to be vertically divided by natural strata. Arbitrary 10 cm levels were employed as the standard vertical division where strata could not be adequately discerned.

The discussions in this manual concerning the methodology and procedures of the excavation of 2 by 2 m by 10 cm units can also be applied to excavations of different size units (e.g. 1 by 2 m, 1 by 1 m). While the 2 by 2 m by 10 cm unit is the standard unit on the project, differing field situations and special research considerations sometimes dictate the use of different procedures.

For each standard 10 cm unit excavated a Level/Stratum Summary Record is completed. The unit can be vertically and horizontally subdivided in a number of ways. Possible horizontal subdivisions are halves, quadrants, and segments. Arbitrary levels and natural strata can be subdivided, 5 cm sublevels being a common subdivision to produce finer vertical control of materials.

Control Blocks

A suite of special samples are recovered from selected general units as they are excavated. This results in control columns of samples which are representative of the levels or strata excavated. These samples can be used as comparative data for future investigations and in their own right, as indicators in conjunction with the general recovered artifacts of the natural and cultural vertical change through the matrix. Flotation, fine-screen, and perpetuity samples comprise the basic suite. Specific biosilicate, soil lipid, and pollen samples are also taken occassionally; however, these can be removed from all perpetuity samples if needed.

Features

Features are viewed pragmatically as recognizable, discreet loci of activity or disturbance. In the field features are treated as separate entities independent of the arbitrary general excavation units. Features can be cultural (e.g. pits, hearths, burials) or natural (e.g. large roots, burrows). Features are the result of specific activities, and as such, it is advantageous to segregate feature fill and artifacts from the general site midden matrix.

The law of superposition states that the age of the deposits increases with depth and it is accepted that artifactual materials change through time. Recognizable natural disturbances are often featured to minimize the mixing of more recent materials with older matrix. It is recognized that such natural mixing, or bioturbation, has occurred throughout the history of the site, however, such mixing can be minimized when possible by segregating visible phenomena.

Cultural features are considered to represent activity which took place over a relatively short span of time. As such they theoretically should give clearer insight into the cultural activity occurring than the general matrix.

Each feature excavated is recorded on a Feature Record form (see form section). If the feature is a burial, the Feature Record form is replaced by a Burial Record from (see form section) which contains the same information as the Feature Record and has additional sections tailored specifically for burial data.

Features are numbered consecutively and recorded in a site feature log. Each feature is assigned a Master ID. Cultural feature types expected to be encountered during excavation include clay surfaces, hearths, pits (of various sizes and shapes), burial pits, burials, artifact caches, clusters of bone, ceramics, chipped lithics, ground stone, rock or burned clay, and soil stains.

Special Samples

It is often advantageous to attempt to recover materials that are not caught in the 0.25 inch screen through which general excavation fill is screened or which lie outside the control block in each unit. A number of special samples have been created to target the recovery of these materials. Special samples are also taken anywhere which may be especially productive in the recovery of a certain material. A pollen sample may be taken from beneath a stone slab in hopes that the slab has provided some preservation protection. Another example is the removal of a flotation sample from a suspect area in hopes of recovering small seeds and fragments of plant material or bone.

Eleven types of special samples are recovered on the project. Archaeomagnetic Dating, Flotation, Carbon 14, Soil, Pollen, Biosilicate, Soil Lipid, Fine Screen (0.06 inch), Chemical, Perpetuity, and Plotted Specimens are recovered. The purpose and collection of the special samples is dealt with in detail in a later section.

PLACEMENT OF EXCAVATION UNITS

A number of factors are evaluated in determining the placement of the excavation units on sites. The individual differences in the sites determines the relative importance of each factor. Sites to be tested are necessarily treated differently than sites undergoing major excavation.

Modern Disturbance

Potholes, tree tip-ups, machine disturbance, structures, or any other readily identifiable modern disturbances are avoided if at all possible. Strategic placement of units can be used to investigate modern disturbance where such information is beneficial to site reconstruction.

Coring

Coring is often helpful in determining excavation unit placement. There are two classes of cores; chemical and visual. Cores can be retrieved with either of two coring tools. The tool most often used is an Oakfield 3/4 inch Tube Sampler with extensions. With the tube sampler plugs of earth 20 cm in length are removed in series from the surface to the desired depth. A three inch diameter soil bucket auger can also be used.

Cores can be taken across the site in a systematic fashion, in set intervals on the site grid or in discretionary locations to investigate particular phenomena. Cores taken according to the site grid are usually placed 50 cm south of the grid intersections so as to allow a stake to be driven in at the grid intersection if needed.

Chemical Cores

When chemical cores are taken, each 20 cm plug is given an identification number, bagged, labeled, and taken to the laboratory. Visual descriptions of these cores are made as they are removed from the ground. Tests performed in the laboratory measure the pH, phosphate, and calcium carbonate levels of each sample. Differences in chemical concentration may occur which can be related to the distribution of activity loci or the intensity and duration of activities. The pH of cultural sediments should tend to be more basic than than non-cultural sediments in this environment. Phosphates and calcium carbonates should likewise be in higher concentrations in areas of cultural activity. These tests provide quantitative results which can be overlain on the site map to show how they correlate with visual core data and topographical features.

Visual Cores

A site can be systematically tested for distinct visual anomalies, such as fired clay and charcoal, by using visual cores. Subtle soil color and textural changes cannot be consistantly detected using this coring technique. The number of features located is proportional to the interval size of the coring grid. The closer and more numerous the cores taken, the greater the number of features which should be encountered. As the grid interval is made smaller, however, the number of cores increases dramatically; halving the interval necessitates a fourfold increase in cores. Visual coring is a time consuming technique and must be employed according to expectations, site size, excavation schedule, knowledge of the stratigraphy, and preliminary coring results.

Topography

The topography of the site is an important factor to consider in determining the location of excavation units and stratigraphic trenches. Modern topographic anomalies and areas representative of the general site can be compared to investigate disturbance or spacial distribution of cultural material. Units in the central portion and the periphery of the site can be compared for differences in natural and cultural stratigraphy.

Minor Excavation Units

Many questions can be addressed through the excavation of minor units (1 by 1 m to 4 by 4 m). Questions concerned with cultural and natural stratigraphy, areal distribution, visual, chemical, and topographic anomalies, and other areas of concern can often be most efficiently treated through small excavation units.

Major Excavation Units

Major excavation units are planned to view large areas of the site simultaneously. This is accomplished by opening up large horizontal areas so that associations among features and artifacts can be investigated. It is hoped that by centering large units over possible hearths or living floors, as identified by visual coring, associated features and artifacts will be identified around them. The major excavation units will also provide large samples of the cultural deposits for analysis and

comparison. A broader view of the site formational evidence and the extent of disturbance can be investigated.

STANDARD EXCAVATION PROCEDURES

The procedures detailed here are flexible and can be changed to fit the specific needs of individual sites and excavation situations. The excavation procedures are for use in arbitrary general excavation units regardless of their size. Feature excavation procedures and special sample recovery methods are discussed under separate headings.

Level Determination

The physical stratigraphy is such on most sites to make excavation according to strata boundaries impractical. Arbitrary 10 cm levels, the standard unit thickness on this project, are employed as the vertical control during excavation. The use of levels allows study of vertical distribution of artifacts and possibly the determination of culturally defined strata.

The vertical control of the site is based upon real elevation or elevation relative to an arbitrarily defined benchmark. The base of levels are arbitrarily set at even 10 cm increments (e.g. 97.40 m,97.30 m). The even decimeter elevations are convenient during excavation and analysis. All level elevations within an excavation block and throughout a site are consistent.

The unlevel nature of the modern ground surface creates a slight problem in determining the base elevation for the first level below the surface. A simple procedure was adapted to determine the first base elevation. The average elevation of the block or unit surface is determined and the nearest even 10 cm level is assigned. For example, if the average elevation is 99.34 m, then the level used will be 99.30 to 99.40. When determining what the first level on a site will be, the highest point of the site is determined and is placed in the nearest 10 cm bracket. From this point on, the level elevations are standardized throughout the site.

Excavation Procedures

Excavation can entail various complications to the general procedures. The presence of control blocks, plotted specimens, segments, or features adds additional steps to the excavation.

Basic procedures are described first, followed by procedures needed to accommodate complicating needs.

Basic Procedures

Before any dirt is removed from an excavation unit several things are done. An ID number is obtained for the materials to be recovered in the 0.25 inch mesh screen. This 0.25 inch ID can also function as Master ID for the level if no subdivisions of the unit are made. If the materials are subdivided, including specimen plotting, a separate Master ID must be assigned for the subdivision.

A top of level plan view is drawn and the ID numbers and the excavation procedures are indicated on the drawing. This plan view is usually traced from the base of the level plan from the level above. A Level/Stratum Summary form is begun.

The dirt is usually removed by shovel shaving, with trowels used only for detail work. Levels are maintained through the used of an instrument by the excavator. All fill removed, including the final trowelings, is placed in whellbarrows for transport to the screening station. To each wheelbarrow a completed provenience tag is attached. A short length of flagging tape with the appropriate ID number for the dirt is place in each wheelbarrow. When the 10 cm level has been shovel shaved to the bottom the unit is troweled to check for stains. A plan drawing is then made of the unit.

Control Blocks

Control blocks are areas of some excavation units set aside for the recovery of special samples through all levels or strata of excavation. The number and location of control blocks is variable depending on the size of the excavation block and needs recognized for a site. A 4 by 4 m excavation block usually contains one control block. Larger blocks have multiple control blocks located so as to give a representative sample of all areas of the block.

The control block is a 1 by 1 m square delineated at a chosen location within an excavation unit. This 1 by 1 m square is then divided into 50 cm square quadrants for consistency in sampling. A two to eight liter perpetuity sample is recovered from the northwest quadrant. A two to eight liter flotation (macrobotanical) sample is taken from the southeast quadrant. One liter lipid, pollen, and biosilicate samples are removed from

the southwest quadrant. After the first months of the project, however, lipid and biosilicate samples were abandoned and a decision was made to remove the samples from the perpetuity sample if needed. All dirt not taken as samples from the northwest, southwest, and southeast quadrants is included in the general level fill.

The entire northwest quadrant is screened as a finescreen 0.06 inch sample. The materials from this quadrant which are greater than 0.25 inches in size are included with the materials recovered from the general unit fill.

The location of the control block or the samples within the control block must sometimes be changed due to the presence of features or other observable disturbances which would prevent the samples from being representative of the general level fill.

Plotted Specimens

If the unit excavation strategy warrants, individual artifacts, or small concentrations of artifacts located in situ can be designated as plotted specimens. Such specimens are located according to elevation and grid coordinates, and are assigned unique ID numbers. Recognizable tools are often plotted, however, all artifacts encountered can be plotted if it is determined that such fine provenience control is needed to answer a specific question. Expedience sometimes dictates that no specimens are plotted.

Regular Level Subdivisions

An excavation unit can be horizontally subdivided into halves or quadrants to tighten the provenience control on the materials recovered in excavation. Sub-levels can be employed for the same purpose. Both halves or quadrants, and sublevels can be used in the same excavation unit.

Halves and quadrants are identified by their cardinal position within the unit (e.g. north, southeast, etc.). Sub-levels are designated sequentially as a decimal fraction of the levels (e.g. 12.1, 12.2), however, the sub-level number does not reflect a mathematical relationship with the level. Sub-levels are most commonly used. Each subdivision of this unit, vertical or horizontal, is assigned an ID number which is referenced to the Master ID of the unit.

Segmentation

Segments are usually irregular subdivisions used to segregate indistinct soil changes or artifact concentrations which can be only grossly defined spatially. Segements are recorded as numbers on the Field Provenience form for computer input, however, segments are given letter designations for convenience in the field. If segmentation is employed in a unit, the general matrix of the unit is assigned a segment letter (usually A) as well as any stains or other phenomena which are considered segments. Phenomena which are unlike the general matrix, but which are too ill defined to be designated as features, are usually excavated as segments until they can be defined and excavated as features.

Feature Excavations

Every feature is unique so it is necessary to critically evaluate the excavation procedures planned to facilitate recovery of the greatest amount of data practical. Consistency in excavation procedures is also necessary so that the feature data is meaningful in relation to the site and other features. Excavations, therefore, must be consistent and also flexible. The orientation of the project, as presented here and in the Research Design (Bense, et al 1980), lends some consistency in excavation procedure, as does the use of structured Feature Record forms (see form section).

Features are considered to be recognizable, discrete loci of activity or disturbance. For convenience in the field, natural as well as cultural disturbances can be treated as features. Feature designation allows the fill of a feature to be segregated from the general site matrix. Feature excavations, therefore, prevent artifacts from observable natural phenomena from being mixed with the site matrix, as well as preserving cultural phenomena as discrete units.

Features created by natural phenomena (e.g. burrows, large roots) are usually excavated as massive units and discarded or only screened through 0.25 inch mesh. Visual documentation is performed before and after excavation. Relatively recent natural disturbances tend to contain soft, often discolored, fill and often have irregular plan view shapes with lighter earth along the feature margins. Many features cannot be recognized as burrows or root casts until partially excavated as pit features.

The morphology of cultural features is quite varied. Four morphological groups of features are common and are excavated differently: pit features, surface features, artifact concentrations, and burials. Some features do not fit easily

within these groups because they are comprised of attributes from several groups. The excavation of such features is modified accordingly.

All cultural features are drawn and photographed before and after excavation. Profile drawings are also made if applicable. A perpetuity sample is recovered from almost every feature. Temporally diagnostic projectile point/knives and other tools are plotted if encountered in feature excavation.

Pit Features

Features which upon encounter appear to be pits are usually divided in half for excavation. The first half excavated is normally taken out as a single unit and screened through 0.25 or 0.06 inch mesh, or floated depending upon the nature of the feature. Flotation is the normal mode of processing. With half of the pit fill removed a profile view is afforded of the remaining half. Profile photos and drawings are then made. If distinct strata are observed the remaining half is excavated according to those strata. If the fill of the remaining half is homogeneous it is not divided further before removal.

Surface Features

The horizontal extent of surface features is determined within the excavation block. The top of the feature is exposed, photographed, and mapped. Surface features can be horizontally subdivided in halves or quadrants, or they can be segmented. Such features can also be subdivided into strata. Archaeomagnetic dating samples can be taken from hard fired earth if sufficient quantity of high quality exists. Larger surface features are often excavated in halves. Maps are drawn at stages in the excavations. If applicable, profiles are drawn.

Artifact Concentrations

Concentrations of artifacts can occur on a surface as well as in a pit. In many instances it is impossible to determine if a concentration is on a surface or in a shallow depression due to the condition of the site matrix. The artifacts in a concentration are exposed, drawn, and photographed. Each included specimen can be individually plotted and assigned an ID number if such control is necessary.

Burials

Excavation of a suspected burial pit is carried out like that of other pit features. If skeletal remains are encountered they are completely exposed for recording. Any artifacts possibly associated with the burial are treated as plotted specimens.

Site Stripping

The removal of mixed or unproductive strata to expose more information strata may be advantageous in some situations. Stripping with heavy machinery, such as a backhoe or boxscraper, can often substantially increase the effective area of the site excavated or examined. All strata slated for removal by stripping are tested first in a controlled manner. Due to time considerations only limited areas of the sites can be considered for stripping. Several strata on a site may warrant additional exposure. In such cases different strata are exposed in different areas of the site.

TESTING

A number of sites were tested during the project. On several sites which were slated for major excavations it was determined that additional testing was needed. On other sites (7), testing was the objective. The purposes of testing are naturally different than those of major excavation. The procedures employed are likewise different and reflect the limitations and goals of site testing. The testing procedures employed are similar to the major excavation procedures where possible to insure comparability of the testing data to excavations at other sites. The testing procedures used in this project are described below.

SURFACE COLLECTIONS

Where the vegetation cover allows, a representative surface collection of at least 20 percent of the site is made. Individual collection units are randomly selected from within a spacially representative array of units. The site grid is used for horizontal control. Collection units of 4 by 4 m are chosen because their dimensions are easily gridded on the ground and they are multiples of the basic 2 by 2 m excavation unit. Numerous 4 by 4 m units can be accomodated on a site to produce a 20 percent sample, resulting in a statistically reasonable number of cases for data manipulation.

A map of the site is divided into 12 by 12 m squares each containing nine 4 by 4 m units, each of which is assigned a one digit number. A random number table is used to select two collection units from each 12 by 12 m square. Every 12 by 12 m block is numbered in the same way, but the random selection process is repeated for each block. Selection of two of the nine possible excavation units creates a 22.2 percent sample.

Collection units are placed to sample all areas of the site and to test for the boundary of the site. Within the collection units all visible specimens are collected. Time constraints and continuity of collecting personnel can be used to maintain consistancy in the collection.

TEST UNITS

Test units up to 4 by 4 m are placed in an area of minimal surface disturbance to sample a representative area of the site or to investigate specific questions. The size of the test unit is dependent upon the time alloted and the questions to be addressed in the testing. Test units are excavated in 10 cm levels and the fill screened through 0.25 inch screen. Special samples are taken according to the material encountered.

The information from the test pits is used to address questions of horizontal and vertical stratification, disturbance and mixing of site sediments, thickness and depositional history of the site, and the presence and nature of features within the site. Stripping and stratigraphic trenches are used if the site warrants them.

SPECIAL SAMPLES: FIELD COLLECTION

A number of special samples, described above, have been developed to collect materials and data which cannot be obtained through normal field observations and 0.25 inch screening procedures. The purpose of the different samples varies. The method of sample collection likewise varies.

All special samples are given individual ID numbers which are referenced to the appropriate excavation unit Master ID. Special samples from a single Master ID are grouped together on a Special Sample Form (see form section), however, Plotted Specimens from the same Master ID are grouped on their own Special Sample Form to facilitate laboratory processing.

ARCHAEOMAGNETIC DATING

The earth's magnetic field has changed through time resulting in the magnetic north pole shifting. An archaeomagnetic dating sample is used to recover small cubes of fired clay to be measured for magnetic orientation. Clay particles have slight magnetic moments which orient towards the location of the magnetic pole at the time of the last firing. The fired clay must have been physically undisturbed since firing to be suitabel for sampling.

The archaeomagnetic dating sample must be taken using special equipment which requires training and experience. Excavators should realize that patches of fired clay, as well as the more obvious hearths, can potentially yield important temporal data. Determination of the suitability of a particular feature for this sampling should be left to the site supervisor and to individuals trained to recover the samples.

The degree of firing, the size of the area to be sampled, and the condition of the area relative to disturbance are important considerations. A minimum of eight sample cubes is recommended while twelve are preferred if possible. Each sample cube minimally destroys 50 cm of the fired clay.

BIOSILICATES

Biosilicates, or phytoliths, are silica structures found in parts of some plants. They can often be identified to species. Their silicate content causes them to be brittle, but also resistant to decompostition. The biosilicate samples recovered on this project contained 0.25 to 1 liter of earth. During the first few months of excavation these samples were removed from every control block. It was soon decided that the perpetuity sample could be used for the biosilicate samples and this procedure was followed subsequently.

CARBON 14

When large pieces or concentrations of carbonized wood or nut are encountered in excavation, they are often collected as a carbon 14 sample if their context warrants. These are located precisely then bagged in a double pouch of aluminum foil. The charcoal is handled as little as possible. The samples are dried in the laboratory.

FINESCREEN - 0.06 inch

It is often advantageous to process fill through 0.06 inch mesh screen to recover many of the materials which pass through the normal 0.25 screen. Especially valuable are the small lithic flakes and the carbonized plant remains which can be caught in the smaller screen. All of the fill destined for finescreening first passes through a 0.25 inch screend to segregate the larger materials. These 0.25 inch materials are part of an ID separate from the finescreen materials. Finescreen samples are systematically recovered from a 50 by 50 cm square of the control blocks. Finescreen samples can also be taken from features, segments, and general level excavations if desired.

FLOTATION/MACROBOTANICAL SAMPLING AND PROCESSING

A two or four liter sample is collected from each control block level. Part of all cultural features is floated; often all fill from a feature except that taken as a perpetuity sample is floated. Flotation is useful for collecting charcoal for stratigraphic carbon 14 dating, especially where there are relatively few pieces of charcoal in a sizeable volume of fill. The samples are placed in plastic bags and dried as much as possible before floating. Flotation (Macrobotanical) samples are most efficiently processed in the field in a flotation barrel. The flotation barrel consists of a modified 30 gal. drum nested in a 55 gal. drum. The solid bottom of the 30 gal. drum has been removed and replaced with 0.06 inch screen. The top of the barrel has also been removed and a sluice spout welded to the side. The larger drum is fitted with five shower heads located at its base below the small drum. The shower heads supply water and upwards agitation. A gate valve is located at the bottom of the large drum for drainage. The spout of the inner small barrel nestles into a smaller spout in the large drum. The spouts lead to a 0.5 mm mesh sieve (U.S.A. Standard Testing Sieve No. 35, Tyler equivalent 32 mesh).

Samples to be floated are best if dry and powdery although they can be moist. Some samples, depending upon their clay content, need to be presoaked in a dispersant, usually trisodium phosphate. A 0.25 inch screen is placed over the barrel and the sample washed through. The 0.25 inch fraction of the sample is retained in the top screen. The agitation of the water helps loosen small aggregations of dirt. Many organic particles will float and these pass through the spout into the sieve. The sample is run until material is no longer floating to the surface. The barrel is then partially drained. The sample is collected and bagged as three fractions; the 0.25 inch, the 0.06 inch

finescreen from the bottom of the inner barrel, and the sieve fraction. Further processing is carried out in the laboratory.

LIPIDS

In the first several months of the project excavations, soil samples were systematically collected from all control block levels to be tested for the presence of lipids in the soil. The sample was placed in single plastic bags with an ID number tag. Lipids are chemically recognizable remains of animal cells. The ubiquitous bioturbation in the sites coupled with the realization that considerable professional disagreement existed concerning the usefulness of the sample prompted a discontinuation of lipid sampling. As was the case with biosilicate samples, the perpetuity samples taken throughout the project can be used to recover lipids in the future.

PERPETUITY

Perpetuity samples are bags of earth collected from features, control blocks, or other locations to provide material for future specialized tests. Biosilicate and lipid studies have already been mentioned as possible uses for perpetuity samples. The samples provide spatially located material for tests which are not presently known or commonly used. The earth is placed in a heavy plastic bag with an ID number tag. A tag with full field provenience information is tied to the bag.

PLOTTED SPECIMENS

The percieved importance of individual specimens varies depending on the stratigraphic location of the find, the comprehension and outlook of the excavator, and the unique character of the site stratum. Plotted specimens are individual or small concentrations of specimens which are located precisely in three dimensions relative to the site grid. Each plotted specimen receives a unique ID number. Not all materials located _in situ_ are plotted. The site director or another supervisor determines what materials are plotted.

POLLEN

Pollen samples were taken from each control block level and any other location selected by the excavation supervisor through most of the excavation of the first two sites (22IT539 and 22IT576). Analysis of several suites of samples from those sites showed there was no pollen preservation. Subsequently pollen sampling was suspended. Several samples taken on another site because of special circumstances did yield pollen when analyzed by new procedures at the University of Indiana.

The pollen samples taken ranged in size from 0.24 to 1 liter. Three to five centimeters of earth was scraped away with a clean trowel. The sample dirt was then placed in a fresh zip-lock plastic bag and sealed with minimal air. Methanol was placed in some samples. The sample bag was then placed in another clean bag and sealed. A tag with the sample ID number was placed between the bags. Contamination was minimized by taking the sample quickly and using clean equipment.

SOIL/SEDIMENT

Soil samples are taken to test the physical and chemical characteristics of the dirt. Textural analysis is the most common test performed on such samples. A one liter sample is adequate for most soil tests. As with other samples an ID number tag is included with the dirt and a provenience tag is attached to the bag.

SOIL MONOLITH

Intact columns of dirt can be removed from profiles for laboratory work and preservation. Stabilization is achieved through the use of Vinylite resin or some similar product. A straight column at least 10 cm wide and 5 cm deep is cut from a profile. A firm backing board is placed against the face and the column is cut loose and bound to the backing. Cleaning and preservation is performed in the laboratory by trained personnel.

0.25 INCH SAMPLES

Special 0.25 inch samples are taken to segregate quarter inch materials in instances where the Field Provenience forms do not readily allow further horizontal or vertical subdivision. These samples have been taken in the case where a unit has been arbi-

trarily divided into sublevels and quadrants, and variation in the dirt needed to be segregated.

FIELD FORMS

A number of field forms have been developed to aid in the systematic and controlled recording of data. Standardized format for data recording is a necessity of a large project concerned with the excavation of numerous sites over a long period of time by a substantial number of personnel. Formalized field forms are the most efficient way to guarantee a measure of standardization and comparability of field data in such a case.

There are additional advantages to the use of standard field forms. Direct computer input of field provenience and other descriptive data is possible. The forms can also be used to record narrative descriptions, observations, and conclusions concerning features, levels, strata, or individual materials. Such narratives, along with codified data, become the excavator's field notes for particular excavation units. Additional general interpretations of the site, intra- or intersite relationships, the environment, or the like can be kept in field notebooks.

FIELD PROVENIENCE FORM

The Field Provenience Form has changed twice during the length of the excavations (Figures V.1,2,3). The data recorded has remained essentially the same; however, the form metamorphosed to reflect needed additions and restructuring of the format of the computer data.

The first Field Provenience Form (Figure V.1) was used during the first two weeks of the project. It was used primarily to re-code the 1978-1979 testing data from the sites to be investigated on this project.

The second Field Provenience Form (Figure V.2) was used throughout the excavations of Sites 22IT576 and 22IT539. This extended from January to September 1980. The principle of the first two field forms was to fill in each variable with a value. Non-standardized values were entered as "Other".

The final Field Provenience Form (Figure V.3) was designed by the new data manager to the project in August 1980. This form is divided into three parts; one for the recording of computer input data, another for notes , and another is a list of codes used in completing the computer input data section.

The upper right section of the form has spaces for the name of the recorder, the dates the form was begun and finished, and the excavation block. The space for BLOCK is often used to indicate the stratigraphic trench, test pit number, or other large units if the ID does not come from a block. The information on this part of the form is not entered into the computer and is considered as part of the "notes" section.

The remainder of the "notes" section is open for any narrative descriptions, interpretations, or explanations needed. In practice this section is not often used to any great extent because the descriptions and interpretation on the Level/Stratum and Feature Records are usually adequate and allow a number of related proveniences to be considered together.

The list of codes is located at the bottom of the form. This list reflects the values in use at the time the form was designed and printed. During excavation it became necessary to assign a number of additional code values. These will be listed with the discussion of the individual variables.

The coded values are placed in the appropriate variable blanks. Not all variable blanks are filled in for all ID numbers. In all cases the values placed in the variable blanks are right justified.

The variable for SITE is always filled in. The value used is the county specific, sequential site number assigned by the State Archaeologists' Office of the Mississippi Department of History and Archives. The assigned site numbers follow the convention of the Smithsonian Institution River Basin Surveys' Trinomial Site Designation System (e.g. 22IT590 is entered as 590, 22MO531 is entered as 531). The alphabetic designation of the county is not entered because there are no duplicates of site numbers encountered in this project. If at some later date duplicate site numbers from two counties are entered a segregating marker can easily be incorporated.

The Master ID variable is filled out on all forms. The Master ID is put on the forms for all the ID numbers grouped within that Master ID. The form which describes the Master ID has that number listed under both the variables MASTER ID and ID.

The variable for UNIT CATEGORY is used on each form. The codes for unit category are:

1. 1/2 by 1/2 m
2. 1 by 1 m
3. 2 by 2 m
4. 4 by 4 m
5. Feature
6. Special Sample

7. Void ID
8. Control Block
9. Modern Disturbance
10. Natural Disturbance
11. 1 by 2 m
12. Pollen Column
99. Other

There is room to add more values should the need arise. The value used for UNIT CATEGORY, in addition to being descriptive of the type of excavation unit, directs the recorder to the pertinent variables below. The arbitrary dimension units (e.g. 2 by 2 m) and the control block need only deal with the variables under the Location and Miscellaneous headings. Special Samples are not entered on this form, but rather are entered on a modified version of this form, the Special Sample Form (Figure V.4) which is discussed separately. Modern and Natural Disturbances as well as Pollen Columns usually need only coordinates and elevations, and a short verbal description.

If the Feature value is used in the Unit Category variable, then the variables under the Feature heading must be filled out for the Master ID of the feature. The centerpoint and elevations for the feature are placed under the Location heading, subdivisions of the feature are also described under the Location heading.

Every ID number assigned on a site is represented by a form. All ID's except special sample IDs are represented by an individual Field Provenience Form and entered under the *ID variable*.

The COORDINATE variable is used to record the northeast corner of arbitrary dimension units according to the Cartesian grid which was imposed on the site. The coordinates are in meters south and west of the 0-0 point of the site grid. The COORDINATE variable records the centerpoint of features, modern and natural disturbances, and pollen columns within the site grid.

If arbitrary levels were used in the excavation of a unit the level number is entered under the LEVEL variable. Subdivisions of the level, natural or arbitrary, are designated by placing a number to the right of the decimal in the variable blank (e.g. 12.1,12.2). These subdivisions are explained in the Notes section and entered on the list of values. Where strata were followed in the excavations, the stratum number and any subdivisions were recorded under the STRATUM variable.

If horizontal subdivision of features or arbitrary dimension units was needed such subdivision is noted in the HORIZONTAL SUBDIVISION and the HORIZONTAL SUBDIVISION DESCRIPTION variables.

The value codes listed at the bottom of the form are a complete list of the values used. Halves and quadrants are arbitrary,

geometric subdivisions. Segments are usually irregular subdivisions utilized to segregate indistinct soil changes or artifact concentrations which could be only grossly defined spacially.

The variables of TOP and BOTTOM ELEVATION decribe the elevations of the excavation as they relate to the site datum. The site datum does not relate to the mean sea level nor the arbitrary site datum (used when the sea level is not known).

The variable VOLUME is used to record the volume of the excavation unit in cubic meters (1000 liters equals one cubic meter, therefore 16 liters equals 0.016 cubic meters). The volume of excavation units allows a direct comparison to be made of the relative number of materials from different size units. The values for the SOIL TYPE variable reflect field estimations of U.S.D.A. soil texture classifications.

FEATURE TYPE is an interpretive and descriptive variable designed to aid in separating the features into classes. Some of the feature types listed are very broad (e.g. Pit) while others are more limited and precise (e.g. Burial Pit).

A sequential FEATURE NUMBER is assigned to each feature identified on a site. A feature is represented by two different numbers; the feature number and the feature's Master ID. The computer uses the Master ID to group all IDs assigned to subdivisions and special samples from the feature. The feature number is more convenient to use in the field and laboratory.

The variable PLAN VIEW describes the shape of the plan view of the feature. The PROFILE variable describes a representative profile through the feature.

The LENGTH and WIDTH of the feature is recorded by noting the endpoints of its longest axis (x and x') and its second longest axis (y and y') according to the site Cartesian grid. The seemingly indirect method of recording length and width was adopted to facilitate computer plotting of the feature on distribution maps. The x, x', y, and y' points are determined during field mapping of the feature. It requires geometrical equations, however, to determine the length and width from the computer data.

SPECIAL SAMPLE FORM

The Special Sample form (Figure V.4) is an abbreviated version of the Field Provenience form which was designed specifically for recording the provenience of the various special samples. The design of the form allows up to 21 samples under a single Master

ID to be recorded on each form. This arrangement substantially reduces the bulk of paperwork. It has been found that paper flow in the field and laboratory was facilitated by listing plotted specimens on a sheet separate from the other special samples, including Flotation Samples.

As on the Field Provenience form, there is space on the upper portion of the Special Sample form for entry of the Block, Recorder, and the Dates of the work. Blanks for Unit Coordinates and Feature Number are provided for the convenience of the excavator, however, this data is not entered into the computer data file. The variables of SITE and MASTER ID are always filled in. Each Special Sample is assigned an ID number. The column marked "F" under the ID number variable is used by the data keypuncher to place a special flag on flotation samples. The variables under the location heading are self-explanatory and are used to record the precise provenience of the Special Sample. The VOLUME of the special sample is recorded in liters. Within the computer the volume data is made directly compatable with the cubic meter volumes from the Field Provenience forms (1000 liters equals one cubic meter). Codes for the TYPE of Special Sample are listed on the bottom of the form. In addition to those listed the code 12 represents a special 0.25 inch sample. Space is available for short descriptions or notes.

LEVEL/STRATUM SUMMARY RECORD

The Level/Stratum Summary (Figure V.5) is not a computer form. It is essentially formalized field notes used to record a specific level or stratum in a basic excavation unit. This design allows a systematic record to be kept of all general excavation units. The codes used on the Field Provenience form are not used, rather all information is written.

The form is designed to be for the most part self-explanatory. The blanks for benchmark (BM), benchmark elevation (BM Elev.), and instrument height (H.I.) fell into disuse because units were often excavated over a number of instrument changes. The ARTIFACT SUMMARY which was to be attached was a computer printout of the materials recovered from the units. The hoped for immediate turn around of computer data was not feasible. Instead, the excavator recorded notable artifacts or trends of recovery under the area for additional comments.

The second page contains gridded areas for drawing plan views and profiles. Profiles, however, were regularly drawn of only the entire block or unit profile and placed on separate profile sheets. A proposed excavation plan was included below the plan view of the bottom of the unit level to suggest how the following

level should be excavated. Such a written plan was advantageous because the large size of some blocks often made it impractical for the same excavator to dig subsequent levels of the unit. These base of level maps were also used to maintain the floor plan map of the entire excavation block.

In addition to the base of level map drawn on the form at the completion of that level's excavation, a pre-excavation map was drawn of the top of the level before excavation was begun. This was accomplished by tracing the base of level map from the previous level. On this pre-excavation map the Master ID and any subdivisions and special samples of the unit, and their ID numbers, were indicated to aid the laboratory in checking provenience and as a visual record of the locations of the subdivisions and special samples. This pre-excavation map was attached to the form.

The Level/Stratum Summary form was used as a folder to hold all the related Field Provenience and Special Sample forms which were included under the Master ID for the level or stratum.

FEATURE RECORD

The Feature Record form (Figure V.6) is designed to systematically guide the recording of feature data. It is not a computer data form; the pertinent provenience and descriptive data is input from the feature's Master ID Field Provenience form. Much of this information is repeated on the Feature Record form for convenience and redundancy. Each feature on the site is given a unique, sequential number. The parts of the Feature Record form are self-explanatory. The first and third pages of the form call for specific information. The second page is gridded with spaces for identifying information. The plan view and profile of the feature can be drawn on this page of the form. The fourth page of the form is blank and can be used as space for further discussion or description. Extra pages of drawing and notes can be attached to the form.

BURIAL RECORD

The excavation and recording of human and nonhuman burials pose special problems and necessitate specific data. A Burial Record was devised as a modified Feature Record form to accomodate the special needs of burial excavation (Figure V.7). Each burial is given a unique, sequential number for the site, in addition to its feature number and Master ID.

The Burial Record is composed of four pages. The first three pages are comprised of provenience data, descriptive trait lists, and areas for descriptions of various aspects of the burial. The fourth page contains a line drawing of an articulated human skeleton, with the major bones labeled, and a tooth chart. This page is used as a skeletal inventory as well as a guide to the relative position of individual bones within a skeleton.

ID LOG

A log of ID numbers assigned on a site is maintained in a permanently bound engineer's level book. The provenience data of the unit or sample is entered with the appropriate sequential ID number. The information recorded includes the feature number, special sample type or unit type, level or stratum, northeast corner or centerpoint coordinates, and any additional comments needed to describe the unit or excavation labeled by the ID number. The log is also used to record the time when the excavation forms and artifacts are completed in the field and have entered the laboratory.

FEATURE LOG

A Feature Log is maintained for each site excavated. This form was designed for convenience in assigning sequential feature numbers and maintaining centralized descriptions and provenience data for all the features excavated at a site.

ARCHAEOMAGNETIC SAMPLE FORM

A special form (Figure V.8) has been developed for the recording of descriptive data needed to process archaeomagnetic dating samples. The form is patterned after that used by Dr. Robert DuBois of the University of Oklahoma. The postional data from the individual sample cubes is entered in the numbered spaces at the bottom of the form. The gridded area of the form is provided for a schematic drawing of the sample. A description of the procedures employed in obtaining archaeomagnetic dating samples is presented in the Special Studies Procedures section (Chapter 4) of the Phase I report.

PROJECT FIELD FORM SUMMARY

The field forms used during this project are designed to capture the maximum amount of information for computer use and still allow for the invaluable and unstandardized observations. As has been described, the forms have evolved, especially the Field Provenience Form. However, this was expected somewhat in a project that spent 15 continuous months in the field with two large excavation staffs. Changes were limited and when made, all previous information was converted to the final format.

Figure V.1

First Field Provenience Form

Recorder ____________

Started ____/____/____

Finished ____/____/____

EXCAVATION DATA: 22 _ _ _ _ _

Block ____

GENERAL

ID No.: (1) _ _ _ _ _

Master ID: (58) _ _ _ _ _

Unit Coordinates, NE Corner:

(2) _ _ _ . _ _ S

(3) _ _ _ . _ _ W

Unit Category: (4) _ _

1. ½ x ½
2. 1 x 1
3. 2 x 2
4. 4 x 4
5. *Feature*
6. *Special Sample*

99. *Other; Specify, 3 words max.:*

(5-7) ____________________

Level No.--Subdivision: (10) _ _ - _

Stratum No.-Subdivision: (11) _ _ . _

Horizontal Subdivision: (8) ____

1. *Half* 2. *Quadrant*

Hrzntl. Sbdvsn. Description: (9) ____

1. *North* 5. *Northeast*
2. *East* 6. *Southeast*
3. *South* 7. *Southwest*
4. *West* 8. *Northwest*

Top Elevation: (12) _ _ _ . _ _

Bottom Elevation: (13) _ _ _ . _ _

Unit Volume (m^3): (14) _ _ . _ _ _

RECOVERY

Type: (56) ___

1. *¼ in* 2. *¼ in + fine* 3. *Sieve*

Percent Screened: (57) _ _ _ . _

SOIL

Hue: (48) _ _ . _ / _

1. *Y* 3. *R*
2. *YR* 4. *Gley*

If Gley (4), specify: (49) _ _ _ _ / _

Value: (50) _ . _

Chroma: (51) ___

Soil Type: (52) _ _

1. *Clay* 8. *Loamy Sand*
2. *Sandy Clay* 9. *Sandy Loam*
3. *Silty Clay* 10. *Loam*
4. *Clay Loam* 11. *Silt Loam*
5. *Sandy Clay Loam* 12. *Silt*
6. *Silty Clay Loam* 13. *Gravel*
7. *Sand*

14. *Other; Specify, 3 words max.:*

(53-55) ____________________

ID. No. _ _ _ _ _

SPECIAL SAMPLE

Type (15) _ _

1. Archaeo Mag
2. Macro Botanical
3. C-14
4. Pollen
5. Soil
6. Plotted Specimen
7. [illegible]
8. Lipid
9. Perpetuity
10. Fine-screen
11. Chemical Core
99. Other; Specify, 3 words max.:

(16-18) ______________________

Center-point Coordinates:

(19) _ _ _ . _ _ S

(20) _ _ _ . _ _ W

Top Elevation: (21) _ _ _ . _ _

Sample Volume (l):(59) _ _ _ . _

FEATURE

Number (22) _ _ _

Type: (23) _ _ _

1. Clay Surface
2. Hearth
3. Pit
4. Post Hole Pattern
5. Burial Pit
6. Human Burial
7. Animal Burial
8. Cache
9. Bone Cluster
10. Ceramic Cluster
11. Chipped Lithic Cluster
12. Ground Stone Cluster
13. Rock Cluster
14. Burned Clay Cluster
15. Soil Stain
99. Other: Specify, 3 words max.:

____

Horizontal Subdivision: (24) ___

1. Half 2. Quadrant 3. Segment

Hrzntl. Sbdvsn. Description: (25) ___

1. North
2. East
3. South
4. West
5. Northeast
6. Southeast
7. Southwest
8. Northwest

Level No.--Subdivision: (26) _ _ - _

Stratum No.--Subdivision: (27) _ _ - _

Length Coordinates (x & x'):

x: (28) _ _ _ . _ _ S;(29) _ _ _ . _ _ W

x': (30) _ _ _ . _ _ S;(31) _ _ _ . _ _ W

Width Coordinates (y and y'):

y: (32) _ _ _ . _ _ S;(33) _ _ _ . _ _ W

y': (34) _ _ _ . _ _ S;(35) _ _ _ . _ _ W

Center-point Coordinates:

(36) _ _ _ . _ _ S;(37) _ _ _ . _ _ W

Top Elevation: (38) _ _ _ . _ _

Bottom Elevation: (39) _ _ _ . _ _

Plan View: (40) ___

1. Oval
2. Rectangular
3. Round
4. Square
5. Irregular
9. Other; Specify, 3 words max.:

(41-43) ______________________

Profile: (44) _ _

1. Basin
2. Belled
3. Flared
4. Hourglass
5. Lens
6. Rectangular
7. Stepped
8. Triangular
9. Irregular
10. Other: Specify, 3 words max.:

(45-47) ______________________

Figure V.2

Second Field Provenience Form

Office of Archaeological Contracts
The University of West Florida
Midden Mound Project

Recorder ________
Date Started ________
Date Finished ________

EXCAVATION DATA: SITE 22 _ _ _ _ _

GENERAL

ID NO.: (1) _ _ _ _ _

Unit Coordinates, NE Corner:

(2) _ _ _ . _ _ S
(3) _ _ _ . _ _ W

Unit Category: (4) ___

1. .5 x .5
2. 1 x 1
3. 2 x 2
4. 4 x 4
5. Feature
6. Special Sample
7. Void I.D.
8. Other; Specify in 3 words or less:

(5-7) ____________

Horizontal Subdivision: (8) ___

1. Half
2. Quad

(9) ___

1. N 5. NE
2. E 6. SE
3. S 7. SW
4. W 8. NW

Level No. - Subdivision:

(10) _ _ - __

Stratum No. - Subdivision:

(11) _ _ - __

Top Elevation (m) (12) _ _ _ . _ _

Bottom Elevation (13) _ _ _ . _ _

Unit Volume (m^3) (14) _ _ _ . _ _

SPECIAL SAMPLE

Type: (15) ___

1. Archaeo Mag
2. Macro Botanical
3. C-14
4. Pollen
5. Soil
6. Plotted Specimen
7. Other; Specify in 3 words or less:

(16-18) ____________

Center Point (m)(19) _ _ _ . _ _ S
(20) _ _ _ . _ _ W

Elevation of Top (m):

(21) _ _ _ . _ _

FEATURE

Number: (22) _ _ _

Type: (23) __

1. Clay Surface
2. Hearth
3. Pit
4. Post Hole Pattern
5. Burial Pit
6. Human Burial
7. Animal Burial
8. Cache
9. Bone
10. Ceramic Cluster
11. Chipped Lithic Cluster
12. Ground Stone Cluster
13. Rock Cluster
14. Other

Horizontal Subdivision:

(24) ___ 1. Half
2. Quad

(25) ___ 1. N 5. NE
2. E 6. SE
3. S 7. SW
4. W 8. NW

Level No. - SUbdivision:

(26) _ _ - _

Stratum No. - Subdivision:

(27) _ _ - _

Length Coordinate:

(28) _ _ _ . _ _ S

(29) _ _ _ . _ _ W

Length Coordinate:

(30) _ _ _ . _ _ S

(31) _ _ _ . _ _ W

Width Coordinate:

(32) _ _ _ . _ _ S

(33) _ _ _ . _ _ W

Width Coordinate:

(34) _ _ _ . _ _ S

(35) _ _ _ . _ _ W

Center Point:

(36) _ _ _ . _ _ S

(37) _ _ _ . _ _ W

Elevation of Top (m):

(38) _ _ _ . _ _

Elevation of Bottom (m):

(39) _ _ _ . _ _

Plan View:

(40) ___ 1. Oval
2. Rectangular
3. Round
4. Square
5. Irregular
6. Other: Specify
in 3 words or less:

(41-43) ____________________

Profile:

(44) ___ 1. Basin
2. Belled
3. Flared
4. Hourglass
5. Lens
6. Rectangular
7. Stepped
8. Triangular
9. Irregular
10. Other; Specify
in 3 words or less:

(45-47) ____________________

SOIL

Hue:

(48) _ . _ _ 1. Y
2. YR
3. R
4. Gley

If Gley (4), specify:

(49) _ _ _ _ / _

Value:

(50) _ . _

Chroma:

(51) ___

Soil Type:

(52) ___ 1. Clay
2. Sandy Clay
3. Silty Clay
4. Clay Loam
5. Sandy Clay Loam
6. Silty Clay Loam
7. Sand
8. Loamy Sand
9. Sandy Loam
10.
11. Silt Loam
12. Silt
13. Gravel
14. Other; Specify
in 3 words or less:

(53-55) ____________________

RECOVERY

Type: (56) ___
1. .25" 2. .25"+ fine 3. USGS 35

Percent Screened: (57) _ _ _

Figure V.3

Final Field Provenience Form

SITE

MASTER I.D.

UNIT CATEGORY *

I.D.*

FIELD PROVENIENCE

UWF

RECORDER ____________

DATE BEGUN ____________

DATE ENDED ____________

BLOCK ____________

LOCATION

COORDINATE - S

COORDINATE - W

LEVEL

STRATUM NO

HORZ SUBD

HORZ SUBD DESC

TOP ELEVATION

BOT ELEVATION

MISC

VOLUME

SOIL TYPE

FEATURE

FEATURE TYPE

FEATURE NUMBER

PLAN VIEW

PROFILE

LENGTH X - S

LENGTH X - W

LENGTH X' - S

LENGTH X' - W

WIDTH Y - S

WIDTH Y - W

WIDTH Y' - S

WIDTH Y' - W

NOTES:

CODES

UNIT CATEGORY: 1. 1/2 X 1/2, 2. 1 X 1, 3. 2 X 2, 4. [illegible], 5. FEATURE, 6. [illegible], 20. OTHER

SOIL TYPE: 1. CLAY, 2. SANDY CLAY, 3. SILTY CLAY, 4. CLAY LOAM, 5. SANDY CLAY LOAM, 6. SILTY CLAY LOAM, 7. SAND, 8. LOAMY SAND, 9. SANDY LOAM, 10. LOAM, 11. SILT LOAM, 12. SILT, 13. GRAVEL, 14. OTHER

PLAN VIEW: 1. OVAL, 2. RECTANGULAR, 3. ROUND, 4. [illegible], 5. IRREGULAR, 9. OTHER

PROFILE: 1. BASIN, 2. BELLED, 3. FLARED, 4. [illegible], 5. LENS, 6. RECTANGULAR, 7. STEPPED, 8. TRIANGULAR, 9. IRREGULAR, 10. OTHER

HORZ SUBD: 1. HALF, 2. QUADRANT, 3. SEGMENT

HORZ SUBD DESC: 1. NORTH, 2. EAST, 3. SOUTH, 4. WEST, 5. NE, 6. [illegible], 7. [illegible], 8. [illegible], 9. [illegible], 10. A, 11. B, 12. C, 13. D, 99. OTHER

FEATURE TYPE: 1. CLAY SURFACE, 2. HEARTH, 3. PIT, 4. POST HOLE PATTERN, 5. [illegible], 6. HUMAN BURIAL, 7. ANIMAL BURIAL, 8. CACHE, 9. BONE CLUSTER, 10. CERAMIC CLUSTER, 11. CHIPPED LITHIC CLUSTER, 12. GROUND STONE CLUSTER, 13. ROCK CLUSTER, 14. [illegible] CLUSTER, 15. SOIL STAIN, 20. OTHER

Figure V.4

Special Sample Form

SITE NUMBER

MASTER ID

0 6 UNIT CATEGORY ____ FEATURE NO.

UNIT COORDS
______ S
______ W

FIELD PROVENIENCE
*SPECIAL SAMPLES
*PLOTTED SPECIMENS
*FLOTATION

BLOCK ______
DATE STARTED ______
DATE FINISHED ______
RECORDER ______

ID*		LOCATION				MISC	SPECIAL SAMPLE	
F	NUMBER	COORD - S	COORD - W	LEVEL	ELEVATION	VOLUME L	TYP	DESCRIPTION

CODES
1. ARCHAEO MAG 2. FLOAT 3. C-14 4. POLLEN 5. SOIL 6. PLOTTED SPECIMEN 7. BIOSILICATE
8. LIPID 9. PERPETUITY 10. FINE - SCREEN 11. CHEMICAL CORE 99. OTHER

Figure V.5

Level/Stratum Summary Record

Recorder ____________

Started ____/____/____

Finished ____/____/____

LEVEL/STRATUM SUMMARY RECORD: 22 _ _ _ _ _

Block ____

Unit Type: ________; Coordinates: ________S ________W; Master ID: _ _ _ _ _

BM: ________; BM Elev.: ________; H.I.: ________; Unit Volume: _ _ . _ _ _ m^3

Level No.: ____/____; Elev.: ________ to ________; Thickness: ________

Stratum No.: ____/____; Min. Thickness: ________; Max. Thickness: ________

Unit Floor Elevations: NE ____; SE ____; SW ____; NW ____; Ctr ____

ID Nos., Level/Stratum: ______________________________

Special Samples, Type & ID: ________-________ ________-________

________-________ ________-________ ________-________

________-________ ________-________ ________-________

Excavation & Recovery: Surf. Col. ___; Cntrl. Surf. Col. ___; Shovel ___; Trowel ___;
Shovel & Trowel ___; Machinery ___; Other ______________________
Unscreened ___; Screened: Wet ___; Dry ___; ¼ in ___; ¼ in & fine ___; Sieve ______

ARTIFACT SUMMARY--*See Attached*

Features, Originating: ______________________________

Features, Continuing: ______________________________

Soil Description (Munsell Color, Texture, Disturbances/Intrusions & Other Comments):

____

____

____

____

Additional Comments: ______________________________

____

____

____

____

LEVEL/STRATUM SUMMARY RECORD: 22 _ _ _ _ _

Photos: B&W _____, Date(s) _________; Transparencies _____, Date(s) _________

Drawings: Plan _____; Profile - N, S, E, W; Other _________________________

Approved _________ __________________

Unit:

_________ S _________ W

Level/Stratum: _____--____

Master ID: _ _ _ _ _

By: ____________________

Date: _____/_____/_____

Figure V.6

Feature Record

Recorder ____________

Started ____/____/____

Finished ____/____/____

FEATURE RECORD: 22 _ _ _ _ _

Block ____

Feature No.: ________; Type: ________; Master ID: ________

BM: ________; BM Elevation: ________; H.I. ________

Level/Stratum Recognized: ________; Level/Stratum of Origin: ________

Provenience: Length--(x) _____ . ___S/ _____ . ___W; Elev. _____ . ___

(x') _____ . ___S/ _____ . ___W; Elev. _____ . ___

Width --(y) _____ . ___S/ _____ . ___W; Elev. _____ . ___

(y') _____ . ___S/ _____ . ___W; Elev. _____ . ___

Center-point _____ . ___S/ _____ . ___W; Elev. _____ . ___

Elevation of Top: _____ . ___; Bottom: _____ . ___; Volume _ _ . _ _ _ (l)

ID Nos., Feature Subdivisions: ____________________

Special Samples, Type & ID: ________-________ ________-________

________-________ ________-________ ________-________

________-________ ________-________ ________-________

________-________ ________-________ ________-________

Excavation & Recovery: Surf. Col. ___; Cntrl. Surf. Col. ___; Shovel ___; Trowel ___;
Shovel & Trowel ___; Machinery ___; Other ____________
Unscreened ___; Screened: Wet ___; Dry ___; ¼ in ___; ¼ & fine ___; Sieve ________

Description of Fill & Matrix (Munsell Color, Texture, Contents & Notes):

____

____

____

____

Stratigraphic Relationships (Superimposed on/by): ____________________

____

FEATURE RECORD: 22 _ _ _ _ _

Feature No.: ________: Center-point: ______ . _____S/ ______ . _____W

Associated Features: ____

__________________ ____

____

Artifactual Material Associated with Feature: *(See Attached Lab Analysis)*

	Absent	*Sparse*	*Medium*	*Heavy*
Chipped Stone	____	____	____	____
Ground Stone	____	____	____	____
Other Lithics	____	____	____	____
Debitage	____	____	____	____
Ceramics	____	____	____	____
Human Remains	____	____	____	____
Animal Bone	____	____	____	____
Shell	____	____	____	____
Metal	____	____	____	____

Other ____

General Comments, Miscellaneous Notes & Description: ____________________

____

____

____

____

____

____

____

Probable Cultural Affiliation: Paleo-Indian ___; Archaic ___; Gulf Form. ___;

Woodland ___; Mississippian ___; Protohistoric ___; Historic ___; Unknown ___;

Other ____

Basis for Probable Cultural Affiliation: ________________________

____

____

Photos: B/W _____, Date(s) _________; Transparencies _____, Date(s) _________

____

Drawings: Profile - N, S, E, W; Plan ____; Other ____________________

Approved ________________________

Feature No. ________ Master ID: _ _ _ _ _

Center-point _____ . ___S _____ . ___W Drawn by _______________

Date _____/_____/_____ *Include two grid points, visual scale, and North arrow.*

Figure V.7

Burial Record

Recorder ________________

Started _____/_____/______

Finished _____/_____/______

BURIAL RECORD: 22_____

Block _____

Burial No.: ________; Feature No.: ________ Master ID: ___________

BM: ________ BM Elev.: ________ H.I. ____________

Provenience: Length—(x) _____.___S/ _____.___W; Elev. _____.___

(x') _____.___S/ _____.___W; Elev. _____.___

Width —(y) _____.___S/ _____.___W; Elev. _____.___

(y') _____.___S/ _____.___W; Elev. _____.___

Centerpoint _____.___S/ _____.___W; Elev. _____.___

Elevation of Top: _____.___; Bottom: _____.___; Volume: _____.___( )

ID Nos., Feature Subdivisions: ______________________________

Special Samples, Type & ID ______________________________

____

____

____

Excavation & Recovery: Surf. Col. ___; Cntrl. Surf. Col. ___; Shovel ___; Trowel ___;
Shovel & Trowel ___; Machinery ___; Other ______________________
Unscreened ___; Screened; Wet ___; Dry ___; ¼ in ___; ⅛ & fine ___; Sieve _____

Burial Type: Primary _____; Secondary _____; Cremation _____; Species: _______

Individuality: Partial ___; Single ____; Multiple ___; Mass _____

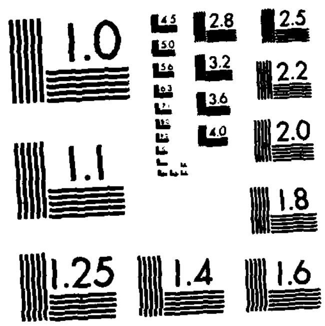
Articulation: Articulated ___; Semiarticulosis ___; Rearticulated ___;
Disarticulated ___; Disturbed (Note Kind) ______________________

Position: Prone ___; Supine ___; L. Side ___; R. Side ___; Seated ___;
Standing ___; Face rotation ___; Arms: Side ___; Crossed on pelvis ___;
Crossed on chest ___; Hands to face ___; Other ______________________

Comments: ______________________________

Orientation (Azimuth): Grave ___; Container ___; Body ___;

AD-A126 693 ARCHAEOLOGICAL INVESTIGATIONS IN THE UPPER TOMBIGBEE 3/6
VALLEY MISSISSIPPI:..(U) UNIVERSITY OF WEST FLORIDA
PENSACOLA OFFICE OF CULTURAL AND A.. J A BENSE ET AL.
UNCLASSIFIED 1983 DACW01-80-C-0063 F/G 5/6 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

BURIAL RECORD: 22____
Burial No. ____

Sex and Age: Male ____; Female ____; Indeterminate ____; Infant ____; Child ____; Juvenile ____; Adult ____; Old Adult ____; Indeterminate ____.

Pathologies (Fractures, Lesions, Genetic or Cultural Abnormalities): ________

____

____

Skeletal Elements (Shade attached human skeletal drawings, indicating elements present and complete the following assesment):

	Complete	More than ½	Less than ½	Absent
Total Skeleton	____	____	____	____
Cranium	____	____	____	____
Pelvis	____	____	____	____
Major Long Bones	____	____	____	____
Dentition	____	____	____	____

Preservation: Good ____; Fair ____; Poor ____; Preservative Used: ____

Container Type: Hull (Unmodified pit) ____; Post/Stone Cist ____; Post/Stone Cover ____; Post/Stone Box ____; Tomb ____; Urn ____' Coffin ____; Other ____

Descriptions & Deminsions: ________________________

____

____

Grave Goods/Inclusions (Frequency, Type & Placement): ________________

____

____

____

Description of Fill & Matrix (Munsell Color, Texture, Contents & Notes):

____

____

Stratigraphic Relationships (Superimposed on/by): ________________

____

____

Associated Features (Describe): ________________________

____

BURIAL RECORD: 22_____
Burial No. ____

General Comments, Miscellaneous Notes & Description ______________________________

____
____
____
____
____
____
____

Probable Cultural Affiliation: Paleo-Indian _____; Archaic _____; Woodland _____;

Mississippian _____; Prehistoric _____; Historic _____; Unknown _____;

Other ____

Basis for Probable Cultural Affiliation: ______________________________

____
____

Photos: B/W _____, Date(s) ______, Transparencies _____, Date(s) ___________

____

Drawings: Profile - N, S, E, W; Plan _____, Other ____________________

Approved ____________________

Additional Comments:

Figure V.8

Archaeomagnetic Sample Form

UNIVERSITY OF WEST FLORIDA
OFFICE OF ARCHAEOLOGICAL CONTRACTS
ARCHAEOMAGNETIC SAMPLE

SAMPLE DESIGNATION: ______________________

SITE NAME: ______________ SITE NUMBER: ______________

SITE LOCATION: ______________________

DATE COLLECTED: ______________ COLLECTOR: ______________

PRINCIPAL INVESTIGATOR: ______________________

ADDRESS: ______________ ESTIMATED FEATURE DATE: ________

______________ FEATURE NUMBER: ______________

FEATURE DESCRIPTION: ______________________

____

CULTURAL ASSOCIATION: ______________________

____

REMARKS: ______________________

1. ______________
2. ______________
3. ______________
4. ______________
5. ______________
6. ______________
7. ______________
8. ______________
9. ______________
10. ______________
11. ______________
12. ______________

APPENDIX VI

DATA MANAGEMENT MANUAL

by

Robert R. Ryan

INTRODUCTION

This manual is designed as a beginning user's guide and as a technical reference to users of the Midden Mound Project's archaeological site data. For the new user, who is either unfamiliar with computers or specifically with IBM OS/370, it is highly recommended that he/she use this guide along with individualized instruction. This manual partially duplicates information more thoroughly documented in other IBM and NERDC publications; reference is made when it is suggested that the user consult the publication directly.

The manual is written in as non-technical language as is possible; unfortunately, it is necessary to acquaint you with some of the jargon since you will need to reference other publications. The information is arranged in such a way that the new user can read and perform the operations at a terminal. There is no substitute for hands-on experience. The more experienced user may wish to skim the sections he/she is familiar with and consult only those sections which are pertinent to his/her interest.

There is no attempt to teach the user SAS or SPSS. It is assumed that the user will pursue learning either of these statistical packages on his/her own and will use this manual to obtain the necessary skills which will facilitate the learning of SAS/SPSS. The following references are strongly recommended for beginning statistical users:

SAS, Institute Inc.
1979 SAS Introductory Guide . SAS Institute Inc. Raliegh, N.C.

Nie, Norman H, Hadlai Hull, et. al.
1975 SPSS Primer . McGraw Hill Book Co., New York, N.Y.

Both of these publications provide step-by-step instruction and are available through most college bookstores.

IBM OS/VS2 TSO

TSO is an IBM system product which allows you and a number of other users to use the facilities of the computer, concurrently. TSO facilitates interactive and batch processing. By batch, a control card format, such as keypunch cards is implied. Each card has a single "command" and associated "parameters" which direct the computer to run a job in a prescribed manner. The sequence of the cards (commands) is especially important.

Typically, a job begins with the user's name and account information on the first card, followed by a password card, an output destination card, an input source card, a program execution card, and generally, the actual program. If all of this seems difficult to you, do not worry; it is really much simpler once you have run a few jobs.

Batch programs can be run from a TSO environment by creating "files" to simulate card decks. The user enters the information at a terminal much as he/she would as if he/she were at a keypunch machine. However, instead of submitting the cards to a card reader, the user directs the file with "card images" to the "internal reader". The primary advantage of this system is in the savings of time over keypunching. Another advantage is that the information can be stored on tape or some other storage medium which cannot get mixed up (as will happen with cards) and is not as bulky as stacks of card files.

Interactive computing, on the other hand, allows the user to communicate more or less directly with the computer. Whereas in a batch job the user submits and then awaits completion of a job, an interactive, or time-sharing environment, permits the user to communicate with the computer. You communicate with the system by typing commands; the system responds to your requests by performing the work immediately, prompting for more information, or sending back an error message that the job could not be performed. The advantage of interactive computing is obvious: if you make a mistake the computer tells you just that. The mistake can then be corrected and re-entered. In a batch environment, the entire job might fail if one mistake was encountered.

The advantages and disadvantages of batch and interactive computing can be summarized as follows:

-Batch attempts to maximize the efficiency of the computer by keeping busy all the major components - CPU, printers, disk and tape drives, etc..

-Batch processing permits the user to determine the computer resources he/she will need, which represents a marked savings in time and money. Frequently, production reports are not needed until the next day or several days later, therefore, the user can take advantage of reduced rates.

-Interactive computing allows many people to use a computer at one time, maximizing the individual's use of the computer, not the efficiency of the computer.

TERMINAL CHARACTERISTICS

TSO terminals are generally of two types: CRT (Cathode Ray Tube) or teletype, which is similiar to a typewriter. Whether you are using a CRT or teletype, and regardless of the make of the equipment, all terminals perform similiar functions. Unfortunately each terminal is slightly different and you will probably have to experiment with yours to find out which keys/functions work.

If you make a mistake while you are typing - before you depress the RETURN (or ENTER) key - backspace the cursor under the error and type the correct information. To replace a character with a blank space, move the cursor under the character and depress the space bar. Remember, you may only backspace while you are on the same line and have not depressed the RETURN key. Some terminals will have a BACKSPACE key, some will have an left-pointing arrow, and for some you will need to depress the CTRL and "H" keys at the same time.

To stop the terminal from displaying either voluminous output or undesirable input, depress the BREAK key. The output or line that you were entering will be canceled and you can resume typing TSO commands. If you depress the BREAK key to freeze a listing on the display and wish to resume, press the RETURN key right away. The display will continue.

Certain keys affect the display but not the content of the information under NERDC's version of TSO. Except for the left-pointing arrow, all of the arrow keys, HOME and CLEAR keys, and LINE FEED key will alter only the display. To move the cursor, the line advance, or any character more than once, depress the REPEAT key and the desired key at the same time. On some terminals, you will need only to apply slightly more pressure on the desired key.

TSO COMMANDS

TSO commands consist of a command name followed by one or more parameters (also called "operands" in IBM documentation). Parameters supply specific information required by the command to perform the requested operation. Some commands (usually system status commands) require no parameters, such as TIME. Most commands have "defaults" built into them. Defaults are assumed parameters in the event that the user does not declare them. For example, in the command:

```
LIST 'U.F0700013.S10.ARCHDATA'
```

LIST is the command followed by the file name. The default for this command is to list the file with line numbers (if there were line numbers in the file). To override the default, issue the following command:

```
LIST 'U.F0700013.S10.ARCHDATA' NONUM
```

NONUM is a parameter which instructs the list command to supress line numbers from the listing.

Parameters are said to be "positional" or "keyword". NONUM is an example of a keyword, or a specific name/symbol which has a particular meaning to the system. Positional parameters follow the command name in a prescribed sequence. The file name, 'U.F0700013.S10.ARCHDATA' is an example of a positional parameter which must follow the command. If the positional parameter is not provided (and in some instances, the keyword), TSO will prompt the user for additional information. Hence, if the user typed only:

```
LIST
```

TSO would prompt:

```
ENTER DATA SET NAME -
```

In theory, the user supplies TSO with the requested information; however, the prompt often becomes extremely fouled up and will continue requesting information. When this "loop" occurs, the only practical solution is to depress the BREAK key and start over.

SELF-HELP

TSO supports a self-help command, appropriately called HELP. By typing:

```
HELP or
HELP NERDC
```

the user will be provided with a directory of IBM and NERDC TSO commands, respectively. The directory will list each of commands with a summary of their function. (Note: some of the commands under HELP are not supported by NERDC or are superceded by NERDC-added commands). By typing:

```
HELP commandname
    e.g:
HELP BALANCE
HELP LIST
```

HELP QED

the user will be provided with a detailed description of the command, associated parameters, and defaults. Much of the information will seem foreign to you at first; HELP was designed more as a technical reference than as a teaching aid. Experiment with this command and ignore what you cannot understand. TSO commands are presented in the following three lists.

List.1 IBM TSO COMMAND SUMMARIES

ABEND -	Directory of all SYSTEM 370 ABEND codes
ALLOCATE -	Allocate space for an OS data set
ATTRIB -	Set-up DCB file characteristics
DELETE -	Purge a data set from a user's catalog
EDIT -	Invoke IBM's text editor
FREE -	Release a data set or ddname
FREEALL -	Release all allocated data sets or ddnames
LISTDS -	Display data set attributes and/or members
RENAME -	Rename a data set
EXEC -	Execute a command procedure
HELP -	Invoke HELP processor
LOGOFF -	End terminal session
LOGON -	Start terminal session
PROFILE -	Define user characteristics
SEND -	Send message to specified user
TERMINAL -	Define terminal characterics
TIME -	Log session usage time
WHEN -	Conditionally execute next command
WHO -	Provide user id and account/sequence information

CALL -	Load and execute specified load module
LINK -	Invoke link prompter and linkage editor
LOADGO -	Load and execute program
RUN -	Compile, load, and execute program
TEST -	Test user program

List.2 NERDC TSO COMMANDS

BALANCE -	Current balance/charges for access/sequence number
CANCEL -	Cancel batch job
CONCAT -	Concatenate preallocated ddnames
DSAT -	Display allocation/attributes for data sets
DSN -	Display current data set in working storage
DVOL -	Display current free space on direct access device
FILE -	Enter card-images in-stream in command procedure
FREEALL -	Free all data set and attribute lists
HOLD -	Place batch job on hold in queue
NEWS -	Display current NERDC news
PRINTOFF -	Direct hardcopy output of data set to remote printer
RELEASE -	Release batch job that is on hold
RLSE -	Release unused space in sequential/partitioned files
ROUTE -	Direct job output from queue
SCHEDULE -	Submit job for batch processing
SHOW -	Display status of batch job
VTOC -	Display data set(s) on a disk(s)

List.3 RECENTLY ADDED NERDC TSO COMMANDS

COPY -	Copy sequential or partitioned files into a second sequential or partitioned data set
FORMAT -	Control output for printing documents using EDIT
LIST -	Display sequential or partitioned data sets
LISTJES -	Display JES2 sysout data sets from batch job
MERGE -	Merge contents of sequential or partitioned file at the end of a second data set
TSOSORT -	Invoke sort prompter
FETCH -	Direct JES2 sysout data set to terminal or data set
SCSS -	Invoke SCSS (Conversational Statistical System)

ACCESS TO THE SYSTEM

Contact with NERDC is made possible via standard telephone transmission. (Note: access will differ depending on your location. Contact R. Ryan for specific information.) Your terminal is connected to a device called a modem, or acoustic coupler. Dial the correct exchange, listen for a high-pitch sound, and position the telephone cradle in the accoustic coupler or modem.

```
(cr)PPO
IKJ53020A ENTER LOGON
LOGON 60700013 10
NAC0006 ENTER PASSWORD
XXXXXX
secret

NAC0016 NERDC TSO LOGON IN PROGRESS ON NER2 UCB-OE1
OG09B4$ LOGON IN PROGRESS AT 11:51:29 ON SEPTEMBER 1, 1981
READY
```

Where:

(cr) = Carriage return
LOGON 60700013 10 = User ID/Sequence Number
XXXXXX = TSO mask for password
READY = TSO prompt that system is ready to accept commands

Should you continue to have difficulty loging on, contact someone more familiar with the procedure. To logoff the system, simply type:

```
LOGOFF

CPU TIME 00 00 01.9 CONNECT TIME 02 19 58.3  TOTAL CHARGE
                                                    $1.58
CHARGE ID 1364  CURRENT CHARGES $7.80  BALANCE $5.00
OG09B4$ LOGGED OFF TSO AT 11.50.34 ON SEPTEMBER 1, 1981
LAST COMPLETION CODE WAS USER    000
```

Where:

CPU TIME 00 00 01.9 = Actual CPU time in hours, minutes, seconds
CONNECT TIME 02 19 58.3 = Time you were logged on in hours, minutes, seconds
TOTAL CHARGE $1.58 = Cost of both CPU and connect time
CURRENT CHARGES $ 7.80 = Total monthly charges incurred
BALANCE $5.00 = The present balance

Pay close attention to the charge account information: this information is your best indication on whether you are spending too much money and have a large enough balance to continue at your next session.

DATA SETS

Data sets, or files, are collections of information - characters, strings of text, records of data, programs, work space for a program's computation, etc. A data set resides on some form of mass storage, usually magnetic tape or disk, and is addressable by a name supplied by the user (or in some instances, named by a program). Typically, files consists of data or program instructions. Files are usually 80 bytes (characters) in width and can be of almost any length (depending on the storage space available). Files and terminals mimic the older card format more as a conceptual reality rather than a physical reality.

File names are usually supplied by the user. Different installations have different file naming conventions. NERDC requires that an account ID/Sequence number preceed each generic file name. The generic name must not exceed eight characters in length and must begin with a letter of the alphabet. National characters are not permitted in a generic name, however, numbers can be mixed in with alphabetic characters. Data sets may be further "qualified", which means that the generic name may be

followed by a "second level name", which in turn may be followed by a third and fourth level name the user desires. The advantage of qualifying the data set with second, etc. level names is that the system groups the files under the generic name when listing file information. The following are examples of acceptable data set names:

'U.F0700013.S10.CHRIS'
'U.F0700013.S10.SYMAP'
'U.F0700013.S10.SYMAP1'
'U.F0700013.S10.SYMAP1.FLORIDA'
'U.F0700013.S10.SYMAP1.FLORIDA.MAP10'

The following are examples of unacceptable data set names:

'U.F0700013.CHRIS'	(Sequence "S10" number is missing)
'UF0700013.S10.CHRIS'	(Qualifier "." is missing)
'U.F0700013.S10.1SYMAP'	(Generic name begins with a number)
'U.F0700013.S10.SYMAP-1'	(Nat'l character "-" is not allowed)

Note: data sets must be enclosed in single quotes when referencing the file from TSO. When referencing the file from a batch program, quotes are not required.

SEQUENTIAL AND PARTITIONED DATA SETS

There are many different types of data sets, however, only two, sequential and partitioned data sets will be discussed. A sequential file is very much like a stack of keypunch cards, in that one record (line of information) follows the next in a sequence. All of the data sets in the preceding examples were sequential files, by virtue of the naming convention. Partitioned files are also organized sequentially, however a single file may contain many subfiles, or "members". Partitioned data sets are extremely useful for storing many small files together to conserve space on a disk. Another advantage for partitioned data sets is that like-programs or data can be conceptually stored together.

There are a variety of arguments for when to use sequential and when to use partioned data sets, and can be summarized as follows:

-Frequentially accessed/modified files should be sequential rather than partitioned. Modified partitioned files actually "grow" in allocated space and must be "squeezed" to conserve space.

-Files which are small (fewer than 50 lines) should probably

be partitioned, to conserve space. Each sequential file allocates a minimum space (1 track) whether it's used or not. Since many partitioned members can reside in one file, space is conserved (unless it is frequently modified).

Only one partitioned member can be accessed at a time. If a file named 'U.F0700013.S10.SAS' had members SAS1, SAS2, MERGE, FEATURE, and LABELS in it, each member would have to be accessed separately. Partioned members are enclosed in parenthesis as follows:

```
'U.F0700013.S10.SAS(SAS1)'
'U.F0700013.S10.SAS(LABELS)'
```

Each user has in his/her account a catalog of data sets. The DSAT command is used to obtain file information about a user's catalog. One data set or all the data sets in an account/sequence number may be displayed. It is a good idea to frequently display catalog information before and after a job has been run, if for no other reason than to delete unneeded files. A sample catalog for our Project's account might appear as:

```
DSAT 'U.F0700013.S10'
```

SERIAL	ALLOC	USED	EX	DSORG	DCB	ATTRIBUTES	DSNAME
USER04	12	12	1	PO	FB	19069	U.F0700013.S10.SAS
USER03	1	1	2	PS	FB	3600	U.F0700013.S10.SYMAP
USER04	2	2	1	PO	FB	3600	U.F0700013.S10.UTILITY
	14	14					

The DSAT command, in addition to providing catalog information, also displays the location of the data set on a disk (SERIAL), the allocated and used space (ALLOC, USED), the type of data set (DSORG), and the creation date (CR. DATE). Under DSORG you might notice that the files are either PS or PO, meaning physical sequential for sequential data sets, or partitioned organization for partitioned data sets. Partitioned members are not displayed via the DSAT command but may be displayed by typing:

```
LISTDS 'U.F0700013.S10.SAS' MEMBERS

U.F0700013.S10.SAS
--RECFM-LRECL-BLKSIZE-DSORG
  FB    80    4240     PO
--VOLUMES--
  USER04
--MEMBERS--
  SAS1
  SAS2
  MERGE
```

FEATURE
LABELS

LISTDS, or list-display, repeats some of the information you have just seen, and lists each member.

DISPLAYING DATA SETS

Thus far you have displayed a user's catalog and the members of a partitioned data set. If you would like to list the contents of a file use the following command:

```
LIST filename
LIST filename(membername)
    e.g:
LIST 'U.F0700013.S10.SYMAP'
LIST 'U.F0700013.S10.SAS(SAS1)'
```

The entire file will be printed at your terminal. To stop the display, depress the BREAK key. An alternative to using LIST for displaying only selected portions of a data set would be to using QED (Quick Edit), a text editor. QED will be discussed in the next section.

WORKING AND PERMANENT STORAGE

A point which is vital to working with data sets is the concept of permanent versus working storage. During a typical terminal session you will be accessing and creating data sets; however, in most instances, you will be working with a "copy" of the permanent document, called working storage. Any changes, deletions, additions, etc. that you make will be on the working copy, until you direct TSO to make the changes permanent including mistakes. The advantage of this system is obvious: you are not obliged to keep the working file in the event that you destroy the original integrity of the file by "fixing" it. This will happen more than you might guess. If you are editing a data file, and discover that you have irreversibly damaged it, you are not stuck with your blunders. Unfortunately, the reverse situation is less kind; *if you have been making substantial* changes or are inputting new data and you either forget to tell TSO to make the changes permanent, or the computer shuts down unexpectedly (and it will), you will lose all of the contents of that working copy. The permanent file will still exist - without the corrections or new data.

You will learn how to create a file, make corrections, and save the contents of working storage into permanent storage in the next section. If you feel comfortable with the concept of permanent and working storage, go to the next section and remember well the pitfalls of this concept.

TEXT EDITING

Upon gaining access to the system, you will probably wish to either modify an existing SAS or SPSS program, or write your own. Either way, the easiest way under TSO is to create/access a data set via a text editor. There are several editors available under TSO, however, only one, QED (Quick Edit), will be discussed.

QED

QED permits the user to create/obtain a working copy of a permanent data set, make changes, additions, deletions, specify formatting options, and a number of specialized functions. QED allows programming-like features to manipulate data or text. The user can display all or selected portions of the data set, and located specific phrases. Mass corrections are possible, however, also dangerous, since the capability exists in magnifying mistakes on a grand scale. However, since QED uses a working copy of a data set, all changes (including mistakes) need not permanently affect the data set (unless the user has directed QED to save the changes). QED can perform the following:

- List all or selected records of text/data
- Modify parts or the entire record of text/data
- Insert text/data between records or add information to the end of a file
- Specify columns, formats, and tab controls
- Move records or blocks of data from one location to another
- Copy records or blocks of data from one location to another
- Search for specified text
- Scan for proper syntax from a source program (FORTRAN, etc.)
- Automatically number the file for ease of editing
- Copy all or selected contents of a second file to a specified location in the working file
- Permit the user to define programming-like functions
- HELP command permits self-help of QED subcommands and regular TSO commands

To access an existing file, specify the keyword OLD in the QED command. To create a new file, think of a unique file name (one that is not already used and one that can't easily be confused with another) and issue the keyword NEW.

```
QED 'U.F0700013.S10.oldfilename' OLD
QED 'U.F0700013.S10.newfilename' NEW
    e.g:
QED 'U.F0700013.S10.SAS(SAS1)' OLD
QED 'U.F0700013.S10.MYDATA' NEW
```

The system will respond:

```
QED         (For an existing file - you are in edit mode)
00010       (For a new file - line number signifies that
            the system is in input mode, ready to accept
            text)
```

As you can see, you will either be in input or edit (QED) mode. By depressing the RETURN key without entering anything (also known as a null line) you will jump from edit mode to input, or vice versa, depending on which mode you began with. Again, each time you enter a null line, you will jump from mode to mode. Hence, if you were in input mode and made a mistake several lines up, the only way you could correct the error would be to exit input mode by entering a null line. Once in edit mode, you could locate the mistake and make the correction. Continue inputting information by entering another null line.

A common pitfall in using QED is in remembering which mode you are in. Once in input mode, any character - including QED commands - is entered as text. If you do not watch for this, you might enter a whole bunch of commands - CHANGE, FIND, SAVE, etc. and all that will happen is that QED will continue to prompt you for more text. You can always tell when you are input mode when you are using line numbers; the absence of line numbers should inform you that you are in edit mode.

After you have completed entering text or making changes, you may decide to make the changes permanent or eliminate the working copy from storage. The easiest forms of this command are as follows:

```
END SAVE
END SAVE RESTART
END NOSAVE
END NOSAVE RESTART
```

END SAVE will save your QED session into the permanent file, whereas END NOSAVE will delete the working copy from the system. The RESTART keyword will put you back into the working copy you were last using.

Study List 4 and List 5 below, then after you are familiar with the nature of the commands, logon to TSO and create a new file

under your first name. Enter a few lines of text in input mode, and then experiment with the QED edit commands in edit mode. After you are finished, exit QED via END NOSAVE. A sample QED session might look like this:

```
QED 'U.F0700013.S10.KELLY' NEW

00010 THIS IS MY FIRST ATTEMPT AT USING QED AND I AM NOT
00020 VERY GOOD.  TEH END IS NER.  OH SHOT, I AM MAKING
00030 TOO MANY MISTAKES.

QED
CHANGE 20 'TEH' 'THE'
LIST 20
00020 VERY GOOD. THE END IS NER. OH SHOT, I AM MAKING
CHANGE * 'NER' 'NEAR'
CHANGE * 'SHOT' 'WELL'
LIST
00010 THIS IS MY FIRST ATTEMPT AT USING QED AND I AM NOT
00020 VERY GOOD.  THE END IS NEAR.  OH WELL, I AM MAKING
00030 TOO MANY MISTAKES.
END OF DATA
INPUT
00040 COMPUTERS ARE A TERMINAL PROFESSION. IASL
QED
VERIFY
ALTER 40 /IASL
COMPUTERS ARE A TERMINAL PROFESSION. I
                                     I CAN'T CONTINUE
00040 COMPUTERS ARE A TERMINAL PROFESSION. I CAN'T CONTINUE
CHANGE 10 40 'I' '*' ALL
00010 TH*S *S MY F*RST ATTEMPT AT US*NG QED AND * AM NOT
00020 VERY GOOD.  THE END *S NEAR.  OH WELL, * AM MAK*NG
00030 TOO MANY M*STAKES.
00040 COMPUTERS ARE A TERM*NAL PROFESS*ON. * CAN'T CONT*NUE
END NOSAVE
READY
```

List.4

A PARTIAL LIST OF QED COMMANDS, ABBREVIATIONS, AND FUNCTIONS

COMMAND/ ABBRV	EXAMPLE/ USAGE	FUNCTION
TOP (T)	T	Positions pointer to first line in file

BOTTOM (B)	B	Positions pointer to last line in file
UP (UP)	UP nn UP 10	Positions pointer nn lines up from the present position
DOWN (DOWN)	DOWN nn DOWN 7	Positions pointer nn lines down from the present position
FIND (F)	FIND /phrase/ FIND /0231/	Search from present pointer to first occurence of phrase
LIST (L)	L 10	List line 10
	L 10 200	List lines 10 through 200
	L *	List present line
	L * 13	List from the present line the next thirteen lines
INSERT (IN)	IN text	Insert "text" below current position
	INSERT	Insert a stream of data from below the current pointer until the user enters a null line
DELETE (D)	D 10	Delete line 10
	D 10 90	Delete lines 10 through 90
	D *	Delete present line
	D * 21	Delete present line through the next 21 records
COPY (COPY)	COPY xx yy nn	Copy lines xx through yy to behind line nn
	COPY 80 90 10	Copy lines 80 through 90 to behind line 10
MOVE (MOVE)	MOVE xx yy nn	Move lines xx through yy to behind line nn
	MOVE 20 50 80	Move lines 20 through 50 to behind line 80
INCLUDE (INC)	INC 'file' INC 'f' 10 80	Merge "file" to behind current pointer (lines 10 through 80)

List.5
A PARTIAL LIST OF QED COMMANDS, ABBREVIATIONS, AND FUNCTIONS

COMMAND/ ABBRV.	EXAMPLE/ USAGE	FUNCTION
ALTER (A)	A 10 /text	Alter the contents of line 10 beginning with the phrase "text"
	A * /text	Alter the contents of present line beginning with the phrase text
	A * 52	Alter present line beginning column 52
CHANGE (C)	C 10 'old' 'new'	Change old phrase to new phrase in line 10
	C 10 80 'old''new'	Change old phrase to new phrase in lines 10 through 80
	C * 'old' 'new'	Change old phrase to new phrase in present line
	C * 3 'old' 'new'	Change old phrase to new phrase in present line and the next three lines
VERIFY (V)	V	Display the results of QED commands
	V OFF	Turn display off
REPEAT (REP)	REPEAT nn or * FIND /X234B/ DELETE * GO	Repeatedly execute a sequence of commands nn times or (*) until the end of the file. GO executes REPEAT
END (END)	END SAVE	Exit QED and make changes from working file to permanent file
	END NOSAVE	Exit QED and release working file (no changes will be made)
SAVE (SAVE)	SAVE 'file'	Save the contents of the working file into a new (or existing file) other than the data set name you are using

EXECUTION

TSO allows the user to execute jobs in either an interactive or batch environment (using TSO commands to submit and access the job). Some jobs lend themselves to being processed in one environment over another, e.g. editing data is more convenient in an interactive environment, and running production reports is less costly under batch. However, before you run any job interactively, you should become familiar with batch processing in order to understand the mechanics of the computer.

BATCH PROCESSING

TSO simulates a card deck by entering JCL (Job Control Language) statements in-stream (in a prearranged sequence), usually in a data set. You will use TSO statements to build the data set and submit the job to the central processing unit. QED can be used to access and modify an existing program, or create your own. IBM JCL can be somewhat complicated; however, it is possible to make the JCL statements as simple as possible in getting started. JCL statements are not unlike the TSO command language, which is to say, that TSO commands (and JCL) are statements which control the CPU and computer resources. JCL supplies information to the "internal reader" concerning the amount of processing time required for the job, the destination of the output, the source of input, and the allocation of work space necessary for a program's execution. The main difference between JCL statements and TSO commands is that any error in the statements are unforgiving. The mistake will have to be corrected and the entire job re-run.

Each JCL statement begins with either a:

```
//    (Required statement)
/*    (Optional statement)
```

JCL statements may be imbedded throughout the content of a program, however, it may simplest to think of JCL as the beginning of a program. Every batch program must have at least two JCL statements (also known as "cards"): the JOB and EXEC cards. The JOB card identifies the user to the system, determines the number of processing seconds for a program, estimates the number of printed lines in the output, produces a banner for the printed output, and finally selects the priority class for which the job will be run. The EXEC card directs the computer to call, then execute either an existing program, or a compiler to run another program. Typically, the EXEC statement executes a canned-routine which, in turn, executes another program. Hence, while it appears that you are running a program from your JCL statements,

you are merely invoking another program to run the requested program.

Consider the following example:

```
00010 //UWFBOB JOB (6070,0013,2,1,0),'BOB.RYAN',CLASS=A
00020 /*PASSWORD
00030 /*ROUTE PRINT N3.R4
00040 //  EXEC SAS
00050 /*
00060 DATA LITHICS;
00070      INPUT SITE 1-4 TYPE 5-8 MATERIAL 10-12 COUNT 15-20;
00080      CARDS;
00090 05760161 12  00001
00100 05760162 02  00020
00110 05760102 22  00001
00120 05390101 03  00002
00130 05390102 04  00004
00140 PROC FREQ;
00150      BY SITE;
00160            PROC FREQ; BY MATERIL;
00170                TABLES TYPE;
00180                TITLE1 *** SELECTED PROJECTILE POINTS ***;
00190 /*
```

In this example, statement numbers 10 through 50 are JCL statements. Statement 50 signals that program input will follow. Statement 190 is also a JCL statement signaling the physical end of the file. Statement 10 informs the computer:

- UWFBOB	Any eight character name under which the job will be run
- JOB	Keyword JCL statement name
- 6070,0013	Account number
- 2,1,0	Processing seconds, number of lines (in thousands), number of punch cards, respectively
- 'BOB.RYAN'	Banner to appear at top of printed output
- CLASS=A	Priority classification

This information will vary from job to job. If you are running a SAS procedure which uses a large amount of computer memory, you will need to increase the seconds. Consequently, since the job will require more memory it will be more costly; therefore, you may wish to use a different CLASS to reflect a savings.

The PASSWORD card should follow the JOB card; however, under TSO, it is unnecessary to supply the password name. In IBM jargon, this card serves as a "dummy". The ROUTE card directs output to

either a printer, plotter, or card punch. In this example, the job will be printed at N3.R4, which is the destination ID for the University of West Florida. The computer will print only the maximum number of lines specified in the JOB card.

An alternative to this example might be as follows:

```
00010 //UWFARCH JOB (6070,0013,5,10,0),'BOB.RYAN',CLASS=2
00020 /*PASSWORD
00030 /*ROUTE PRINT N3.R4
00040 //  EXEC SAS
00050 //IN  DD DSN=U.F0700013.S10.MYDATA,DISP=SHR
00060 /*
00070 DATA CERAMICS;
00080 INFILE IN;
00090 INPUT CTYPE 17-19;
00100 PROC FREQ; TABLES CTYPE; TITLE3 *** SITE 22 IT 576 ***
00110 /*
```

In this example, the number of processing seconds has been increased from two to five, and the class has been changed to a lower priority. The output will still be directed to the UWF campus; however, SAS will now use input from a data set (DSN=U.F0700013.S10.MYDATA) instead of card entry. Statement 50 is called a data definition statement, or DD name. Later in the program (statement 80), SAS references the D name, which in this example is IN. The DD name then points to the data set name (DSN=) and the disposition (DISP=). Disposition refers to whether the file previously exists (OLD), can be shared by other users (SHR), or will be a new file (NEW). Explanations of DD names tends to become somewhat lengthy; for now, be content with the knowledge that data entry can come from an additional source besides card input.

Priority Classes

The user determines the priority class based on the immediacy of his/her needs, and how much he/she is willing to pay. The highest class (CLASS=5) is charged on a percentage above the normal cost (CLASS=A). Conversely, a lower priority is based on a percentage below normal cost. The following classes have been established at NERDC:

- A Normal
- 5 4 X Normal
- 2 50% less than Normal
- 1 75% less than Normal

Be advised never to use class 5 unless the job is an absolute emergency (beware of the pitfall to declare every job an emergency). Jobs requiring two seconds or less should always be run under class A since the turn-around time is exactly the same for both; (only the charge is multiplied).

Classes 1 and 2 should be used for overnight minimum turn-around. Class 1 is especially desirable for large jobs or production work.

Submitting/Accessing Batch Jobs

In order to simulate a card deck you will need to know several TSO commands to submit the job to the internal reader, cancel the job if you suspect an error, and display the status of the job, or all jobs under a user ID. The SCHEDULE (SCHED) command is used to initiate a batch job. TSO will then scan the job for JCL errors. If no errors exist, TSO will assign your job a specific job number. This job number can then be used to display the status of the job, or list the job back at your terminal. The general structure of this command is as follows:

```
SCHED 'U.F0700013.S10.SAS(SAS1)'
```

The system responds:

```
JOB nnnn UWFBOB   ON INTRDR       BOB.RYAN
```

To display or cancel job:

SHOW J(nnnn)	Displays status of job
SHOW J(1-9999)	Displays all jobs under account
CANCEL J(nnnn)	Cancels execution of job

JOBPARM Statement

An alternative to routing your job to the printer would be to use a JOBPARM card in your JCL statements. Output is then held in a "background queue" awaiting a destination from the user. The user can then direct the output to a printer, a permanent OS data set, or more commonly, to the terminal. The JOBPARM card permits greater flexability than the ROUTE card. Study the following example:

```
00010 //UWFBOB JOB (6070,0013,2,2,0),'BOB.RYAN',CLASS=A
00020 /*PASSWORD
00030 /*JOBPARM Q=F,I
00040 //         EXEC SAS
```

```
00050 //IN  DD   DSN=U.F0700013.S10.MYDATA,DISP=OLD
00060 /*
00070 DATA CERAMICS; INFILE IN; INPUT CTYPE 17-19;
00080 PROC FREQ; TABLES CTYPE;
00090 /*
```

In this example, the JOBPARM card will store the output in a background queue under the job number assigned by the internal reader. The parameters (Q=F) indicate that the user has FETCH (F) authority to obtain a copy of the output. The second parameter (I) indicates that the system will inform the user upon completion of the job. The job may be accessed from a background queue by either of the following:

```
FETCH J(nnnn)
LISTJES J(nnnn)
```

The FETCH command will direct the output to your terminal in one continuous stream. To stop the display, depress the BREAK key. LISTJES is a much more powerful command which permits the user to display selected portions of the job. LISTJES is similiar to QED in that the user is transfered to a subsystem, complete with sub-commands. Until you are comfortable with the FETCH command, do not use LISTJES. When you are ready to explore the possibilities of LISTJES, consult the HELP LISTJES command. LISTJES also has a special HELP directory for its subcommands.

INTERACTIVE COMPUTING

TSO permits interactive computing via command procedures, which are prearranged executable sequence of TSO commands, subcommands, and command procedure statements that can invoke a program or programs. There is no attempt to teach you to write your own command procedures; instead, several have been provided for you to use.

Command procedures are also called CLISTS. When you logon to the system, you will "activate" a CLIST by typing the following:

```
CLIST ACCT(60700013) SEQ(10)
```

Once the CLIST has been activated, you need only reference the specific name of the command procedure, e.g. SAS, SPSS, etc.. The command procedure will then prompt you for specific information, such as the destination of the output, source of input, etc. After the command procedure has obtained the pertinent information, it will then call/execute a program at your terminal. Some software packages are completely interactive (SAS), while others simulate interactive computing. For example, SAS prompts you with a question mark to enter information, and

will continue to do so until you type RUN;. SAS will then compile the information and print the results at your terminal. Upon completion, SAS will prompt you with another question mark. When you are finished, type a /* to indicate to SAS that you are finished.

A sample terminal session might look like this:

```
     CLIST ACCT(60700013) SEQ(10)
     READY
     SAS
     NOTE:  SAS RELEASE 79.5 AT NORTHEAST REGIONAL DATA CENTER
                                                      (00400).


     1?DATA TOOLS; INPUT SITE TYPE $ WEIGHT;
     2?CARDS;
     3¶576 BENTON 20
     4¶576 PROXIMAL 21
     5¶576 DISTAL 1
     6¶576 MEDIAL 20
     7¶576 SHORT 2
     8¶539 BENTON 12
     9¶539 PROXIMAL 1
    10¶PROC FREQ; TABLES TYPE;
   NOTE: DATA SET WORK.TOOLS HAS 7 OBSERVATIONS AND 3 VARIABLES.

    11?TITLE *** ILLUSTRATION USING INTERACTIVE SAS ***;
    12?RUN;


 *** ILLUSTRATION USING INTERACTIVE SAS ***

TYPE     FREQUENCY   CUM FREQ    PERCENT  CUM PERCENT

BENTON       2           2        28.571     28.571
PROXIMAL     2           4        28.571     57.143
DISTAL       1           5        14.286     71.429
MEDIAL       1           6        14.286     85.714
SHORT        1           7        14.286    100.000

    13?/*
    NOTE: SAS INSTITUTE, SAS CIRCLE, BOX 8000, CARY NC 27511
    READY
```

CLISTS have been created for the following programs:

Name	Package	Function
SAS	SAS	Interactive statistics

SPSS	SPSS	Fast-batch statistics
HARVARD	SYMAP/ SYMVU	Line-printer and plotter maps
SQUEEZE	IEBCOPY	Squeezes partitioned data sets

Several other command procedures are being created at this writing. Except for SAS, specific instruction in their use and permission must be obtained from the author.

FINAL CONSIDERATIONS

Should you have read and performed some of the exercises suggested in this manual, you may have discovered on your own, that you now possess a very limited, and hence, a very dangerous knowledge of the system. You now have the capability of damaging or destroying data sets, running up tremendous charges, etc. Unfortunately, there is no way around this.

As a precaution against purposeful or inadvertent destruction of important files, two back-up copies reside on magnetic tape. As you become increasingly competent you may wish to provide the same protection for your most important files.

Finally, you must eliminate unneeded files and job data sets from your account each time you prepare to logoff. It is important that you adhere to the clean-up policy, because by leaving unused space on disk, we are being charged for useless space, and potentially denying disk space to other users. The commands to delete/purge files are as follows (be careful):

```
DELETE 'data setname'
PURGE J(nnnn)
     e.g:
DELETE 'U.F0700013.S10.MYDATA'
PURGE J(7912)
```

As you become increasingly proficient at using the system you will notice that this manual ignored a large number of TSO commands and JCL statements, and even short-cuts. The omissions were intentional, since the primary focus of this manual is to make you comfortable using computers, and specifically, TSO. It is highly recommended that you become familiar with the IBM and NERDC publications, in addition to SAS, SPSS, etc. documentation.

SUGGESTED PUBLICATIONS

IBM PUBLICATIONS

OS/VS2 TSO Terminal User's Guide #GC-0645	Introduces TSO and TSO terminals
OS/VS2 TSO Command Language Reference #GC28-0646-4	General TSO command reference and syntax
IBM SYSTEM 370 Principles Of Operation #GA22-7000-5	Detailed IBM OS reference
OS Utilities #GC28-6586-15	Overview of IBM utilities and control statements
Advanced Text Management System: Terminal Operator's Guide #SH20-2425-0	Reference manual for ATMS under CICS/VS
Advanced Text Management System III: Terminal Operator's Exercise/Reference #5740-XYL	Sample lessons to be used with ATMS Learn lessons

All IBM publications are available through the University of West Florida Campus Bookstore (by order) or by writing:

IBM System Products Division
Product Publications
Dept. 898
P.O. Box 390
Poughkeepsie, N.Y. 12602

NERDC PUBLICATIONS

NERDC User's Manual - General	Overview of computing facilities at NERDC
NERDC User's Manual - Data Sets	Introduces data set usage on IBM 3730 and 3350 disk drives
NERDC User's Manual - Graphics	Guide to graphics at NERDC

NERDC User's Manual - Tape Manual	Guide to tape usage at NERDC
NERDC User's Manual - Utilities	Documents locally implemented utility programs
NERDC User's Manual - Programing Lang.	Documentation for major programing languages and compilers
UPDATE	Monthly newsletter which provides current information about NERDC in an indespensable manner
TSO Guide to using IBM's Time Sharing Option	Introduces TSO as implemented at NERDC
TSO/Superset Utilities Reference Manual	Reference manual for locally implemented TSO utilities
TSO Editor - QED	QED user's guide and reference

All NERDC publications may be printed at a high-speed printer or purchased from:

Northeast Regional Data Center
233 Space Science Research Bldg.
University of Florida
Gainesville, FL. 32611

The entire set of manuals is available on microfiche, as well.

BIBLIOGRAPHY

Chenhall, Robert G.
1975 Museum cataloging in the computer age. American Association For State and Local History, Nashville, TN.

Dougenik, James A. and David E. Sheehan
1975 SYMAP. Union Bookbinding Company, Boston, MA.

1977 SYMVU. Laboratory for Computer and Spatial Analysis, Harvard University, Cambridge, MA.

Health Science Computing Facility; Department of Biomathematics, School of Medicine, University of California at Los Angeles
1979 BMDP, Biomedical computer programs. University of California Press, Berkeley, CA.

Nie, Norman H., Hadlai Hull, et al.
1975 SPSS primer. McGraw Hill Book Co., New York

1976 SPSS statistical package for the social sciences. McGraw Hill Book Co., New York

1980 SCSS a user's guide to the SCSS conversational system. McGraw Hill Book Co., New York

1981 SPSS update 7-9. McGraw Hill Book Co., New York

Peucker, Thomas K.
1972 Computer cartography. Resource Paper Number 17 of the American Association of Geographers, Washington

Sampson, Robert J.
1978 SURFACE II graphics system. Kansas Geological Survey, Lawrence, Kansas

SAS, Institute Inc.
1978 SAS introductory guide. SAS Institute, Raleigh, N.C.

1979 SAS user's guide. SAS Institute, Raleigh, N.C.

1980 SAS/ETS econometrics and time-series analysis. SAS Institute, Raleigh, N.C.

1980 SAS supplemental library user's guide. SAS Institue, Raleigh, N.C.

1981 SAS/GRAPH. SAS Institute, Raleigh, N.C.

1981 SAS 79.5 changes and enhancements. _SAS Institute Technical Report_, SAS Institute, Raleigh, N.C.

ATTACHMENT A.
Sample SAS Programs

File = U.F0700013.S10.SAS(SAS1)

```
//UWFBOB JOB (6070,0013,2,10,0),'BLANCHARD.RYAN',CLASS=A
/*PASSWORD
/*JOBPARM Q=F,I
//  EXEC SAS
//IN     DD DSN=U.F0700013.S10.LAB(LAB590),DISP=SHR
//SASLIB DD DSN=U.F0700013.S10.SAS.LABELS,DISP=SHR
/*
* ------------------------------------------------------------ *
*  USE THIS PROGRAM TO ACCESS ONLY LABORATORY DATA              *
* ------------------------------------------------------------ *;

DATA LAB;
     INFILE IN;
             INPUT SITE 1-5 ID 6-9 CCOUNT 10-12 CWEIGHT 13-16
               CTYPE 17-19 LCOUNT 20-22 LWEIGHT 23-26 LTYPE 27-29
               LCAT 29-30 MATERIAL 31-32;
TOOLTYPE = LTYPE * 100 + LCAT;
PROC SORT;
     BY SITE LTYPE;
PROC MEANS;
     VAR LCOUNT LWEIGHT; BY SITE LTYPE;
     OUTPUT OUT=WORK8; MEAN=SUM;
/*
```

File = U.F0700013.S10.SAS(SAS2)

```
//UWFRYAN JOB (6070,0013,5,2,0),'BLANCHARD.RYAN',CLASS=2
/*PASSWORD
/*ROUTE PRINT N3.R4
//  EXEC SAS
//IN     DD DSN=U.F0700013.S10.PROV(PROV590)
//SASLIB DD DSN=U.F0700013.S10.SAS.LABELS,DISP=SHR
/*
* ------------------------------------------------------------ *
* Use this format to display only field provenience.  Several  *
* variables (LENGTH, WIDTH, DEPTH, VOLUME) have been created    *
* to standardize and simplify output.                           *
* ------------------------------------------------------------ *
DATA PROV;
INFILE IN;
    INPUT SITE 1-4 MASTERID 5-9 UNIT 10-11 FLAG $ 12-12 ID 13-16
        FEATNO 58-60 PLANVIEW 61-62 PROFILE 63-64 LENGTH1 65-69 2
        SOUTH 17-21 2 WEST 22-26 2 LEVEL 27-29 1 STRATUM 30-32 1
        HORZ 33-33 SEGMENT 34-35 ELEV 36-40 2 ELEVBOT 41-45 2
```

```
        VOLUME 46-51 SAMPLE 52-53 SOIL 54-55 FEATURE 56-57
        LENGTH2 70-74 2 LENGTH3 75-79 2 LENGTH4 80-84 2
        WIDTH1 85-89 2 WIDTH2 90-94 2 WIDTH3 95-99 2 WIDTH4 2;
LENGTH=SQRT(((LENGTH3-LENGTH1)**2)+((LENGTH4-LENGTH2)**2));
WIDTH=SQRT(((WIDTH3-WIDTH1)**2)+((WIDTH4-WIDTH2)**2));
IF UNIT = 5 THEN DEPTH = ELEV - ELEVBOT
IF UNIT = 6 THEN LITERS = VOLUME;
   ELSE LITERS = VOLUME * 1000;
PROC SORT; BY MASTERID ID;
PROC PRINT; BY MASTERID;
     ID MASTERID;
     VAR ID UNIT SAMPLE SOURTH WEST SEGMENT LEVEL ELEV FEATNO;
     TITLE2 * * *  MASTER ID CATALOG  * * *;
     TITLE4 ¶¶¶ 22 IT 590 §§§;
/*
```

File = U.F0700013.S10.SAS(MERGE)

```
//UWFBOB JOB (6070,0013,25,1,0),'BLANCHARD.RYAN',CLASS=1
/*PASSWORD
/*JOBPARM Q=F,I
//  EXEC SAS
//IN1    DD DSN=U.F0700013.S10.LAB(LAB606),DISP=SHR
//IN2    DD DSN=U.F0700013.S10.PROV(PROV606),DISP=SHR
//SASLIB DD DSN=U.F0700013.S10.SAS.LABELS,DISP=SHR
/*
* ---------------------------------------------------------- *
*  USE THIS PROGRAM TO MERGE THE LAB AND PROVENIENCE FILES    *
* ---------------------------------------------------------- *;
DATA PROV; INFILE IN2;
     INPUT SITE 1-4 MASTERID 5-9 UNIT 10-11 FLAG $ 12-12 ID 13-16
     SOUTH 17-21 2 WEST 22-26 2 LEVEL 27-29 1 SEGMENT 34-35
     ELEV 36-40 2 FEATNO 58-60;
DATA LAB; INFILE IN1;
     INPUT SITE 1-4 ID 6-9 CCOUNT 10-12 CWEIGHT 13-16 CTYPE 17-19
     LCOUNT 20-22 LWEIGHT 23-26 LTYPE 27-28 LCAT 29-30 MATERIAL
                                                      31-32
PROC SORT DATA=PROV; BY SITE ID;
PROC SORT DATA=LAB; BY SITE ID;
DATA LINK;
     MERGE PROV(IN=INP)
           LAB(IN=INL);
               BY SITE ID;
               IF INL & INP;
PROC SORT; BY FEATNO;
PROC FREQ; BY FEATNO;
     TABLES LTYPE; WEIGHT LCOUNT;
     FORMAT LTYPE LT.;
     TITLE3 *** MORPHOLOGICAL TYPES FROM FEATURES ***;
/*
```

File = U.F0700013.S10.SAS(FEATURE)

```
//UWFBOB JOB (6070,0013,25,1,0),'BLANCHARD.RYAN',CLASS=1
/*PASSWORD
/*JOBPARM Q=F,I
//  EXEC SAS
//IN1     DD DSN=U.F0700013.S10.LAB(LAB606),DISP=SHR
//IN2     DD DSN=U.F0700013.S10.PROV(PROV606),DISP=SHR
//SASLIB DD DSN=U.F0700013.S10.SAS.LABELS,DISP=SHR
/*
* -------------------------------------------------------- *
* THIS ROUTINE MERGES PROVENIENCE DATA TO LAB DATA, BUT      *
* RESTRUCTURES CERAMIC DATA.  SEPERATE LITHICS AND CERAMICS  *
* VARIABLES (CTYPE, LTYPE, CCOUNT, LCOUNT, ETC.) ARE DROPPED *
* AND GENERIC VARIABLES (ARTIFACT, COUNT, AND WEIGHT) ARE    *
* CREATED.  SUBFILES EXIST FOR CERAMICS AND LITHICS, OR THE  *
* TWO SUBFILES CAN BE CONCATENATED AS IN THIS EXAMPLE.       *
* PROC SUMMARY SUMS THE COUNTS AND WEIGHT FOR LIKE TYPES AND *
* PROC PRINT IS USED TO PRODUCE A FREQUENCY-LIKE TABLE       *
* -------------------------------------------------------- *;
DATA PROV; INFILE IN2;
     INPUT SITE 1-4 MASTERID 5-9 UNIT 10-11 FLAG $ 12-12 ID 13-16
     SOUTH 17-21 2 WEST 22-26 2 LEVEL 27-29 1 SEGMENT 34-35
     ELEV 36-40 2 FEATNO 58-60;
DATA LAB; INFILE IN1;
     INPUT SITE 1-4 ID 6-9 CCOUNT 10-12 CWEIGHT 13-16 CTYPE 17-19
     LCOUNT 20-22 LWEIGHT 23-26 LTYPE 27-28 LCAT 29-30 MATERIAL
                                                       31-32
CER=12;
IF LTYPE LT 12 THEN DO;
   DROP LCOUNT LWEIGHT LTYPE LCAT MATERIAL;
   ARTIFACT = LTYPE * 100 + LCAT; COUNT=LCOUNT; WEIGHT=LWEIGHT;
     MATERIAL=MATERIAL; OUTPUT LITHICS;
   END;
IF CWEIGHT NE . THEN DO;
   DROP CCOUNT CWEIGHT CTYPE;
   ARTIFACT=CER * 100 + CTYPE; COUNT=CCOUNT; WEIGHT=CWEIGHT;
     MATERIAL=.; OUTPUT CERAMICS;
   END;
DATA LABLINK; SET LITHICS CERAMICS;
PROC SORT; DATA=PROV;
PROC SORT; DATA=LABLINK;
DATA LINK;
     MERGE PROV(IN=INP)
           LABLINK(IN=INL);
             BY SITE ID;
             IF INP & INL;
PROC SUMMARY;
     CLASS FEATURE ARTIFACT;
     VAR COUNT WEIGHT;
     OUTPUT OUT=TOTALS SUM=;
```

```
        PROC SORT;
        BY FEATNO;
           PROC PRINT; BY FEATNO;
           ID FEATNO;
           VAR ARTIFACT COUNT WEIGHT;
           FORMAT ARTIFACT NEW.;
           TITLE2 2 2 I T 6 0 6;
/*
```

File = U.F0700013.S10.SAS(CHART)

```
//UWFRYAN JOB (6070,0013,2,2,0),'BLANCHARD.RYAN',CLASS=A
/*PASSWORD
/*JOBPARM Q=F,I
//  EXEC SAS
/*
* -------------------------------------------------------- *
* TO EFFECTIVELY USE PROC CHART, USE INPUT DATA FROM THE     *
* RESULTS OF FREQUENCY OR PROC MEANS RUN.  ENTER DATA AS     *
* CARDS.                                                     *
* -------------------------------------------------------- *;
DATA LITHICS; INPUT TYPE MATERIAL COUNT; CARDS;
0101 01 1
0101 02 2
0101 04 3
0101 06 2
0102 01 20
0102 02 9
0103 01 10
etc.
PROC FORMAT; VALUE MAT
                  3= HEATED CAMDEN
                  4= UNHEATED CAMDEN
                  5= FT PAYNE
                  6= TALLAHATA QRTZ
                  7= OTHER;
PROC CHART;
     HBAR MATERIAL/ SUMVAR=COUNT DISCRETE;
     VBAR MATERIAL/ GROUP=TYPE SUMVAR=COUNT DISCREET;
          FORMAT MATERIAL MAT.;
          TITLE SELECTED MATERIAL FREQUENCIES;
/*
```

SUPPLEMENT I

RESEARCH STUDY DESIGN

ARCHAEOLOGICAL INVESTIGATIONS AT ELEVEN SITES IN MONROE AND ITAWAMBA COUNTIES, MISSISSIPPI

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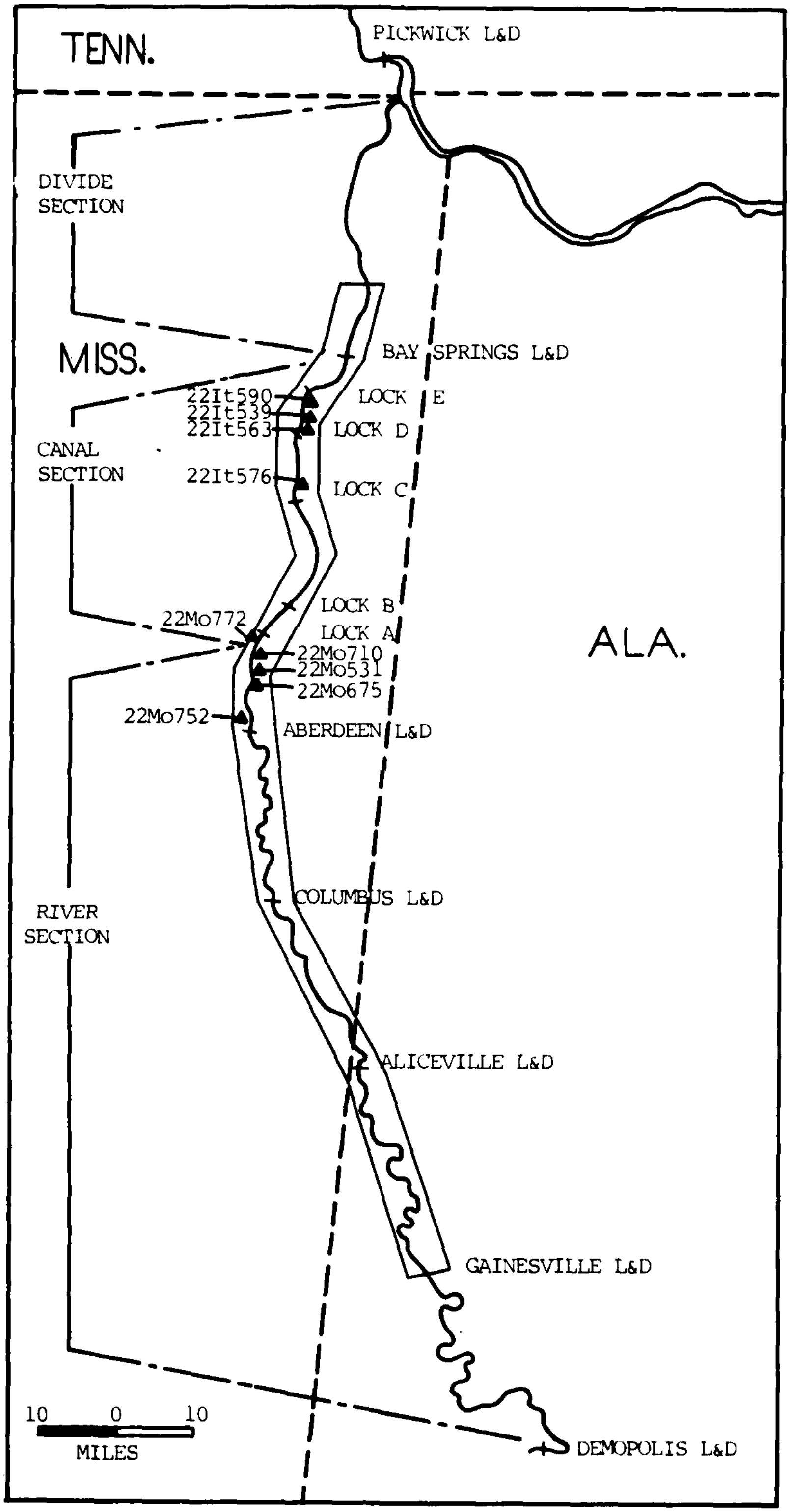
INTRODUCTION

This research design is developed in response to the Scope of Services for archaeological investigations at two sites in the Aberdeen Lock and Dam project and four sites in the Canal Section of the Tennessee-Tombigbee Waterway (Map 1). Additionally, testing and evaluation are required for two sites in the Aberdeen Project and one site in the Canal Section below Lock A. This work will be conducted in compliance with the Archaeological and Historic Preservation Act (Public Law 93-291) and the Identification and Administration of Cultural Resources (ER 1105-2-460).

The midden mound project consists of three phases. Phase I will include excavating six sites and testing three others. Phase II (optional) will consist of additional excavation from the three sites evaluated in Phase I. Phase III will consist of special analyses of data recovered during Phases I and II, and completion and submission of the final report.

The way in which these sites are packaged together should provide a unique opportunity for intensive research in the Upper Tombigbee Valley. From the recent testing conducted on the six sites scheduled for data recovery (Bense 1979 a,b,c), we have been able to determine that they share several common features:

1) Five are midden mounds (22IT590, 22IT539, 22IT576, 22MO710 and 22MO752).
2) Each of them contain thick Archaic deposits and most have Gulf Formational deposits (22IT576, 22IT590, 2IT563, and 22MO710).



Map 1: Archaeological Sites to be Investigated in this Project

The most outstanding aspect of this package is the presence of thick Archaic and Gulf Formational middens. These components should add to our limited knowledge of the pre-Woodland cultures in the Tombigbee Valley. In the central portion (Gainesville, Aliceville, and Columbus Locks and Dams in the Waterway) archaeologists recovered a large quantity of data on the Middle and Late Woodland and Mississippian occupations (Jenkins 1979: Peebles, personnel communication). However, earlier deposits were not found. This increases the importance of the potential contribution of this project by providing a more detailed record of prehistoric people and their adaptation to the Upper Tombigbee Valley.

Our goal in this research is to determine the nature of how hunters and gatherers adapted to the Upper Tombigbee Valley Ethnographic models are used in order to provide behavioral correlates of archaelogical patterning. We are trying to determine how the prehistoric cultural systems in the Tombigbee Valley differ from each other and what conditioned those differences. Basic questions must be answered for our research objective to be fulfilled. Our objectives include determining the nature of the various activities performed at the sites, the patterns of the archaeological record within and between the sites, how they were formed when they were occupied, and why they were abandoned.

Our theoretical approach for this research, set theory, characterizes culture as a system composed of three major subsystems: subsistence, social organization, and ideology. Subsystems of each of these subsystems are discussed separately and developed in narrative form. We use specific ethnographic

and archaeological models to structure the excavation and subsequent analysis. The hypotheses and test expectations generated from this procedure are presented in a separate section. New hypotheses will be developed throughout the project and incorporated into the research design in the monthly progress reports.

The project strategy is presented in a separate section and includes the project structure, task organization, field and laboratory procedures, and data management. It is followed by seven appendices: testing information, organization, schedule, job descriptions, field forms, code list and coding sheets and scientific names of plants and animals.

This research design is not a final document; it is expected to change as new data are gathered and interfaced with existing models, hypotheses, and test expectations. This flexibility allows us to maximize the information which will be extracted during this research.

ORIENTATION

PHILOSOPHY

The basic orientation of this project with respect to the philosophy of science is relatively easy to express, difficult to apply, and complex in its full implication. However, this is true of any explicit approach. Most of the concepts mentioned here are discussed in detail in Hempel (1962, 1966).

The purpose of all science may reasonably be considered the recognition, description, and interrelationship of meaningful entities, events, and processes. All science is descriptive of the relationship of three variables. Scientific reports are often desparaged as being "merely descriptive", but what is actually meant, however, is that their descriptions are insufficient by current standards and expectations.

Within this general concept of science, anthropology is one of the sciences concerned with humans and their activities. The specific characteristics of anthropology serve to distinguish it from the other sciences in the same domain. Some characteristics of this distinction are that the approach is holistic, it uses the culture concept, and employs the comparative method.

If our choice of doctrine is couched in terms of explanation, we must define, or at least sufficiently characterize, what we mean by "explanation". Explanation, or an explanatory proposition, is taken to be a reasonable answer to a non-trivial "why" question. "Trivial" here is meant in the same sense as "meaningless" by Hempel (1966). Limiting explanation to "why" questions is a conscious choice. The result of this is

that explanation is restricted to a causal domain. Propositions, which deal with the existence of things, events, or processes, may be considered existential. These have explicatory intent. We thus distinguish between those propositions which are explanatory (causal) and those which are existential (explicative).

The next step provides the means of assessing reasonability. The most secure way is proof, but this is often logically or empirically unattainable. If our lawful or lawlike statement is in the form of "If A then B" the proof comes from demonstrating that B is a necessary consequence of A. That is, for each occurrence of A there is one occurence of B. The lack of a one-to-one relationship in human behavior is the reason that we must accept lawful or law-like statements in probabilistic form.

More appropriate to evaluations of reasonsbility of explantation is the concept of support of confirmation. Generally speaking, confirmation is based on documentation of empirical and/or logical evidence that is compatible with the explanation, and equally important, the absence of evidence negating the claim. Indeed, searching for the latter is often the most elegant and efficient approach. An infinite number of confirmatory instances do not constitute proof, but contrary instance consititutes disproof. This discussion has been a summary of the basic hypothetico-deductive method moved up one level of abstraction.

Our basic scientific method, founded on testing models and hypotheses derived form ethnographic and archaeological sources, will be the hypothetico-deductive approach. The method we will employ is best summarized by Smith (1978):

1. Selection of a series of alternative hypotheses.
2. Identification and development of a number of specific logical consequences (or testing implications or observational predictions) for each of the hypotheses.
3. Presentation of logical bridging arguments that demonstrate the strength of the cause and effect relationships thought to exist between each hypothesis and its observational predications.
4. Assessment of the relative strength of each of the alternative hypotheses. This testing necessitates comparing observational predictions with the available archaeological data base to determine their empirical validity. The hypothesis that has the greatest number and variety of empirically valid observational predictions can be selected as the best potential solution to the general problem area on the basis of the available data.

Set theory will form an important part of our scientific approach. It is a useful analytical and explicative tool in a number of ways. One is the use of Venn diagrams to depict the relationships of cultural elements (see Cook 1976). Another is the use and development of models of technology. Formal models of ceramic manufacture (Krause 1978) and projectile point/knife morphology (Futato 1977 a,b) were based on set theory.

We do not believe, however, that the utility of set theory will end here. Ultimately it may prove to be an integral part of anthropological research. Richard Krause (personal communication) has posited that the human mind operates by set

addition, set inclusion, and set intersection. He suggests that all human languages include these processes. If the human mind operates by them then all human knowledge should also be organized in this fashion. If this is true, then all human culture is organized by these processes. This concept should be taken as tentative and speculative, but if the initiating statement is accurate, the concept will be accurate as well.

Figure 1 is a Venn diagram showing to the third order the various subsystems of culture about which we should or may be able to generate data during this research. For clarity, each subset is shown as discreet, though this is certainly not the true case. In addition, settlement is not represented on the diagram. Rather that consider settlement separately, we thought of it as a number of subsystems. For example, quarry sites are within the mortuary practice subsystem of social organization. Based on testing, the midden mounds are thougth to be multiple activity sites, aspects of which fall into a number of systems.

This research project will also make use of those elements of systems theory which have proven to be beneficial. These basically include the concepts of systems and subsystems, stasis, dynamic equilibrium, and feedback. These concepts aid in understanding the interrelated processual nature of culture, but the basic orientation of the project will not be grounded is systemics. Indeed, the general applicability of systems theory to archaeology is being strongly questioned. Salmon (1978) gives a recent, cogent, discussion of the potential of systems theory for archaeology.

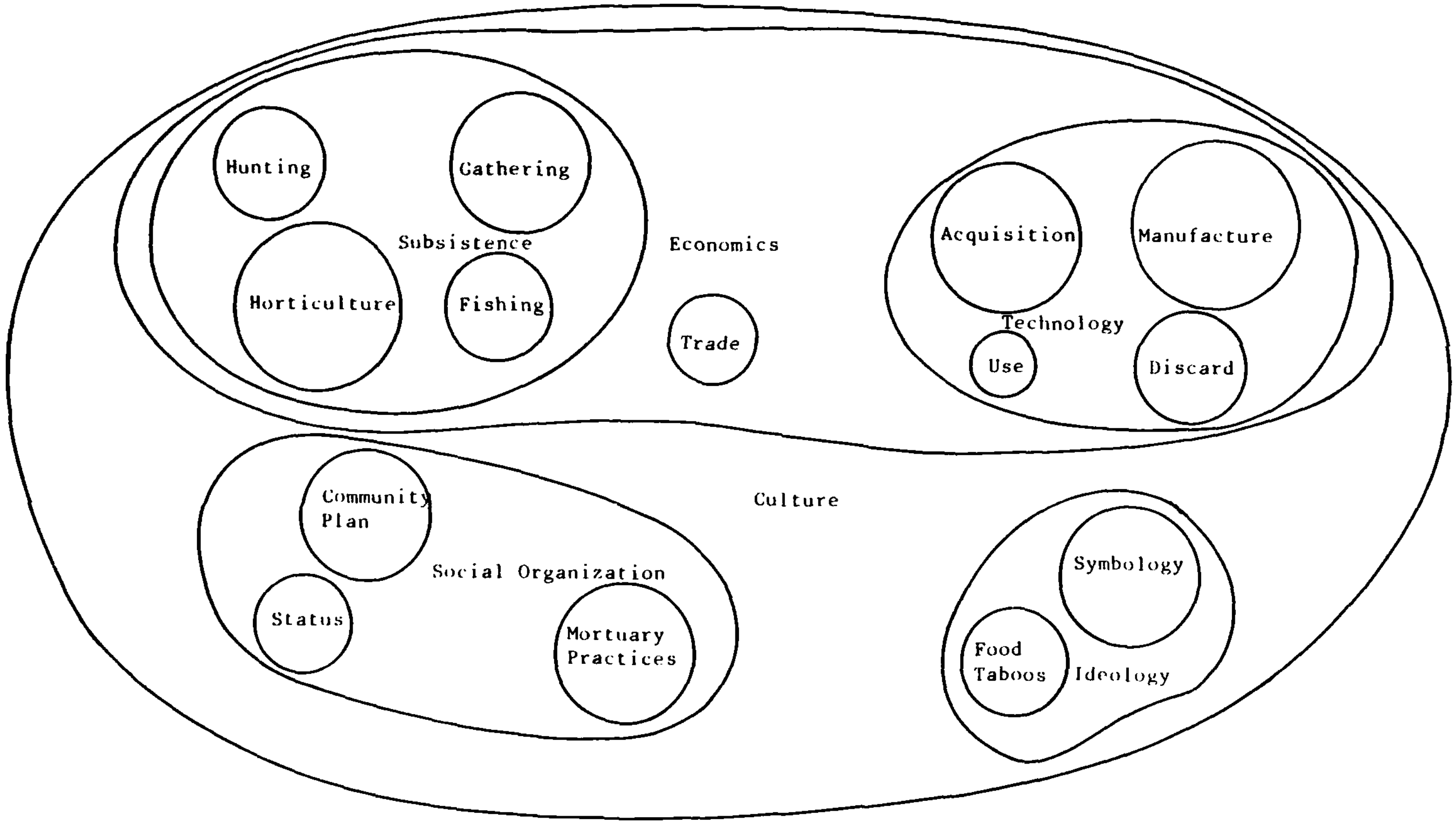


Figure 1. Selected Subsystems of Culture.

ANTHROPOLOCIAL PERSPECTIVE

INTRODUCTION

In this research we will employ a predictive economic model of hunters and gatherers that is based on explicit generalizations derived from ethnographic studies (Jochim 1976). Jochim's model "represents and attempt to assemble and codify observed cross-cultural regularities in economic goals and behavior". Its purpose is to generate "a set of predictions about the nature of a hunting and gathering economy in a particular environment" (Jochim 1976). The chief value of the model is that it allows us to generate a set of predictions about the way hunters and gatherers would use a given environment. We can compare these predictions to actual patterns of utilization for a great variety of activities and products.

Jochim (1976) notes that most archaeological investigations of prehistoric hunter-gatherer economies have been either too general or too specific. By explicitly stating our assumptions of how hunters and gatherers interact with their environment based on regularities among observed ethnographic groups, we can formulate a coherent system of subsistence behavior that will be applicable to a number of research questions. Such a system may then be used to generate implications for comparison with the archaeological record.

GENERAL ASSUMPTIONS

Consideration of prehistoric economies should be grounded in the theories of economic anthropology (Dalton 1977), because the problems encountered in studying present-day hunting and gathering economies indicate which cross-cultural regularities

might have operated in the past. A primary assumption underlying Jochim's (1976) model is that economic behavior is the result of conscious choice. Selection of usable resources, decisions as to their proportional use and time of utilization, and demographic and spatial arrangements chosen in order to accomplish the exploitation, all use human time and energy. They also structure the subsistence and settlement patterns. Hunters and gatherers often expend small amounts of energy in the food quest; allotment of their expenditures depends on the available choices among competing or mutually exclusive activities.

Another assumption is based on resource selection. It represents deliberate choice rather than random or opportunistic utilization of resources. Local, temporal, and spatial variations of resources are present in all hunting and gathering societies, but we think that opportunistic utilization is a conscious decision to alter the usual patterned activities.

A third assumption is that the decision making process is a rational one. This assumption, as part of general decision-making theory, is appropriate for understanding the roles of choices and decisions that are made by hunters and gatherers.

The fourth assumption is based on the uncertain probabilities of outcomes which must be extimated. We assume this because the exact probabilities of the consequences of variouse economic choices are not known. At best they ae estimated from previous experience and new information. This reduces the decision to a partial uncertainty.

The fifth assumption is that the choices are made to satisfy predetermined aspiration levels and not to maximize any specific

measures. Decisions made under uncertain circumstances can best be viewed as a gambling situation. Essentially, alternative choices or competing objectives are considered, or the odds are calculated. This permits the establishment of an order of preference. This principle is used as an important criterion because it represents an attempt to be descriptive. It incorporates decisions which involve procurement of generally nonedible items (hides, antler, and bone), and includes the ability to deal with conflicting goals or objectives.

The sixth assumption is based on a mixed strategy solution of resource scheduling. A mixed strategy solution is the combination of several options, such as: simultaneous performance of more than one activity, simultaneous exploitation of more than one location or region, or sequential changes of activities and locations.

The desire to limit effort underlies all economic decisions and is an important goal that guides the economic behavior of hunters and gatherers. It seems to be the minimization of effort (mini-max theory) or the maintenance of its expenditure within a predefined range.

ORGANIZATIONAL PRINCIPLES

Two organizational principles are basic to Jochim's (1976) model. The first is that problems requiring solutions or choices can be conveniently formulated into systems. We will view the decision-making processes of hunters and gatherers as a result of a set of decisions which resolve specific interrelated problems. The consideration of these problems is best accomplished through

a system approach. Problem identification will determine the boundaries of the system. The objectives which determine the solution of the problems provide the goals for the system.

The primary structure of the model is the relationship of man to natural environment. Because exploitation of the natural environment is culturally defined, the definition of exploitable and desirable resources depends partially upon technology and value systems. The ecological approach no only provides a structure for the focus and priority of exploitive activities; but it also allows us to utilize concepts taken from general ecological theory such as adaptation, stability, diversity, and trophic level.

The subsistence-settlement system can be interpreted as the result of problem solving situations. Scheduling and performance of economic activities in time and space can be seen as a response to three factors: resource availability, site placement, and demographic arrangement. Each may be considered subsystems in the overall network of economic relationships.

Resource use is considered first because it tends to precede and condition site placement and demographic arrangements of hunter-gathering groups. Resources and subsistence activities are the primary factor that determine site placement and demographic patterns.

The most important factors conditioning the economic behavior of hunters and gatherers are their relationships with the natural environment. When these relationships are considered in a systemic framework, it is called the ecological approach. Human ecology consideres a human population as part of the eco-

system (Steward 1955). It focuses on the structural relationship of a group to its natural environment.

The multiple conditioning factors of economic behavior among hunter-gatherers derive from either the natural or social environments. Important factors in structuring the behavior of one group may have little significance to another.

RESOURCE USE SCHEDULING

Goals

The primary function of economic activity is to provide the substenance necessary for population survival. Although this is a biological fact, procurement is governed by many culturally defined objectives. A minimum aspiration level can be established based on the minimum number of calories, trace elements, or specific elements needed in the diet for the survival of the population. The lack of large surpluses and large-scale redistribution systems in most hunter and gatherer societies and the presence of conflicting demands on time and energy indicate the the actual aspiration level is not far above the minimum. The maximization of caloric intake is not an objective among hunting and gathering populations.

To satisfy the food and nonfood needs of the population a security level of income must be maintained. This involves minimizing risk. The total structure of the economy of many groups is shaped partly by this consideration and it determines the importance of different resources and activities. Generally, when two or more kinds of foods are available, one would predict that the population exploiting them should emphasize the more

reliable source. Therefore, reliable food and sources of goods often determine site location.

Limiting effort is a second important goal guiding economic behavior of hunters and gatherers. The exclusion of certain resources seems to depend partially on the difficulty of their exploitation. Not only selection, but timing of exploitation of most resources depends, to an extent, upon considerations of reducing effort or cost. For some groups the structure of the yearly economic cyle is partly determined by subsistence costs. Distance traveled to obtain the resource is part of the subsistence cost. An important objective of hunting and gathering societies is the reduction of effort to a predefined range.

A significant determinant of this level of effort expenditure is the need for *some degree of population aggregation*. Such aggregation, at least for part of the year, is usually supra-familial. The average number of individuals in a local band of hunters and gatherers is usually 25. The purposes and apparent functions of the aggregations are varied. They may include the provision of mates, exchanges of foodstuffs, cooperative exploitation, trade in nonfood items, performance of ritual and curing, or sharing of information.

Thus there are two major goals guiding resource use decisions, based on generalizations of observed regularities among hunters and gatherers.

1. The attainment of secure level of food and manufacturing needs.
2. The maintenance of energy expenditure within a predefined range, determined partly by the need for popu-

lation aggregation.

Some secondary goals in clude desire for good-tasting foods, variety, and prestige, and maintenance of differentiation of sex roles.

Resources

The resources of the system are the means utilized in the decision making process of subsistence. Decisions depend on integrating information from a variety of sources: signs of animals, weather conditions, behavior of animals, dreams and visions, and hunters' past successes. The decisions depend largely upon the eveluation of signs regarding resource behavior and climatic patterns, and a detailed knowledge of the resource behavior is an impressive trait of hunters and gatherers. This knowledge makes understandable their claims for the reliability, efficiency, and adequacy of their subsistence system.

ETHNOGRAPHIC ANALOGY

The archaeological record is at best a static pattern of associations and covariations among things distributed in space. Giving meaning to these patterns is dependent on an understanding of the processes that created them. It is our view that this understanding is greatly enhanced by exposure to the ethnological and ethnoarchaeological systems which produce the archaeological record.

The use of ethnographic analogy requires a uniformitarian view of behavior; human behavior in the past is directly comparable to that of the present. The types of processes operating within and between human societies now are the same as those

operative in the past. Hypotheses also can be developed and tested from archaeological or ethnographic data and can be applied to explanation of newly accumulated archaeological data. There must have been past forms or patterns of behavior which no longer exist anywhere in the world. But they may be identifiable from knowledge of the archaeological evidence in addition to knowledge of relevant general laws.

Two general types of ethnographic analogy exist: the folk culture or direct historical method and the general comparative method. The direct historical approach is generally taken in areas where cultural continuity is strong and where various basic techniques and implements have been practiced and produced for hundreds or even thousands of years.

Ethnographic information can be gathered from anywhere, and can be used as an aid in archaeological interpretation anywhere in the world. The logical framework for applying both kinds of analogy is the same. Regardless of their source the proposed analogies are simple hypotheses. As such they must be tested against independent data before they can be accepted.

CULTURAL SUBSYSTEMS

ECONOMIC SUBSYSTEM

SUBSISTENCE PATTERNS

Historic Interior Southeastern Indian Procurement Patterns

The central hypothesis of Caldwell's (1958) primary forest efficiency model is that the Archaic peoples forged a pattern of forest exploitation so effective that for many groups even in historic times horticulture only supplemented the total diet. To evaluate this hypothesis, Dye (1980) constructed a model of the historic foraging patterns of four interior Southeastern groups: Chickasaw, Choctaw, Creek, and Yuchi. With one exception these groups lived in the Middle Tennessee Valley in the early historic period. Although the Choctaw did not live in the Tennessee Valley, they are included because of their linguistic and cultural similarity to the Chickasaw. The Choctaw also have a well documented subsistence pattern. This model of historic interior Southeastern nonhorticultural subsistence patterns is compared with dietary information form a series of archaeological site in the Upper Tombigbee Valley to test the applicability of Caldwell's model of forest efficiency for the interior southeast.

According to Swanton, few differences existed in the annual economic cycle and dietary patterns of the interior Southeastern Muskogean speakers: Chickasaw, Choctaw, and Creek. In fact, the calendars for each are practically identical (Swanton 1946:262). As the annual harvest of cultivated foods was seldom sufficient to last from one crop to the next, they sought natural food

supplies during a considerable portion of the year. Because the food resources were usually not concentrated, the people scattered about the countryside to camp until planting time (Swanton 1946:256). Hudson notes the gathering, fishing, and hunting of wild foods (1976:272).

In most hunting and gathering societies, the gathering of wild plants, small land fauna, and shellfish is considered to be the basic mode of subsistence, providing the bulk of the diet. This is often the task of women (Lee 1968:41-42). Lee also notes (1968:42) that in "warm-temperate, subtropical, and tropical latitudes, 0 to 30 degree from the Equator, gathering is by far the dominate mode of subsistence." He also states that fishing, where possible, is second in importance. Hunting is generally less important than either gathering or fishing in terms of the amount of food in the diet, as it is the least reliable source of food. This hypothesis was confirmed by Lee (1968) with 59 hunting and gathering societies drawn from the Ethnographic Atlas. Lee's contention may not accurately describe priorities in the historic Southeastern procurement systems, as Hudson (1976) believes that fishing was less important than hunting in the Southeast.

In many hunting and gathering societies, women, small children, and old people not only gather wild plants and shellfish, but also forage for small game that can be easily caugth (Service 1966; 10 Lee 1968:41; Wobst 1974:ix). Jochim notes that among most hunters and gatherers small game is procured throughtout most of the year and usually is accorded a second-place status (1976:39-40). These foods often include eggs

and small, young, or infirm animals (Wobst 1974:ix).

Dye's model (1977; 1980) of the interior Southeastern Indian's nonhorticultural procurement patterns reflects a considerable dependence of hunting, fishing, and gathering. The Creeks left their villages for as long as six months to forage the Southeastern forest; the Choctaw were gone for even longer periods of time.

These historic Indians divided the year into two major subsistence seasons: the cold and the warm (Hudson 1976:259). The cold season began with the autumn equinox and ended with the spring equinox. It was a time of hunting deer, turkey, and small game by men. Seeds and nuts were collected in the early part and roots were dug throughout the season by women. The warm season began with the spring equinox and ended with the authumn equinox. The early portion of the warm season was the spawning time for many fish, and men fished the rivers and streams for them with hoods, nets, and traps. Berries and some fruits were gathered at this time. The latter portion of the warm season was spent gathering fruits and fishing shallow pools with poisons and drags. A short summer hunt was organized between peaks in the fishing season. These activities were seasonal emphases and did not constitue a sharp dichotomy. Hudson (1976:259) note that:

> These oppositions between men's work and women's work, and between warm weather work and cold weather work rose out of the basic structure of the subsistence pattern of the Southeastern Indians.

Among the interior Southeastern Indians the women, children, and elderly collected wild plants, small land fauna, and shellfish. Wild plant foods, including a variety of roots, berries, fruits, and seeds, were collected during every season of

the year and constituted an important element of the diet (Hudson 1976; Swanton 1946;296-297). Pine needles and sassafras leaves were gathered, as were turtle and bird eggs, snakes, turtles, and mussels. Roots and tubers, the most important of these foods, were best collected in the fall and winter months. Several species of the bristly greenbriers were particularly important because they have large, edible roots. The wild potato vine or man-of-the-earth also has a large taproot which can weigh as much as 7 to 14 kg. Roots of the wild onion, groundnut, sassafras, and pine were also eaten by the interior Southeastern Indians (Fernald and Kinsey 1943; Hudson 1976).

Large quantities of berries were picked during the summer months and were either eaten immediately or stored for the winter. The interior groups gather wild strawberries, red mulberries, blackberries, and huckleberries (Fernald and Kinsey 1943; Hudson 1976).

The most important fruit was the common persimmon which is available in late fall and winter. Wild grapes, found in swamps and along river banks, ripened in early autumn. Crab apples, wild plums, and maypops were also gathered (Fernald and Kinsey 1943; Hudson 1976).

Seeds, which were collected in large quantities in the fall and stored in the winter, were an important source of oil. The most important ones were black walnut, American chestnut, and hickory, especially the shagbark. Acorns from the post oak were gathered as well as seeds from the honey locust, water chinquapin, cockspursgrass, cane, and wild rice. Neither the acorn from the live oak nor the pecan is included in this model

because neither plant has a modern natural distribution in this area (Fowells 1965).

The interior Southeastern Indians lived in an area which had some of the best fishing in North America. Fishing was a year-around activity in the Southeast. There seems to have been no taboo against eating fish. They were a common item in the diet of practically all Southeastern societies, although they were apparently less important than the hunting products. The interior Indians fished for some of the largest freshwater fish in North America; these include the catfish and gar. Catfish, as a point of interest, ranks with salmon in having the highest caloric value of any fish (Rostlund 1952:4). Smaller fish were also taken: bass, freshwater drum, jack, perch, lake sturgeon, rad horse, and suckers. Early references to trout probably meant bass (Rostlund 1952:38-39).

With the exception of communal drives, fishing was primarily a male activity, although women generally assisted the men and processed the catch. Several poisons were used in small dried-up pools or impounded streams, such as devil's shoestring roots, Carolina moonseed berries, buckeye seeds, and black walnut hulls. Fish were also stupified by stirring up the mud from the bottom of the stream to partially suffocate them. Hook gorges were used on set lines along the bank and baited traps were set near the bank. Other fishing equipment included the bow and arrow, hand nets, spears, and drags (Hudson 1976:281-284; Rostlund 1952; Swanton 1946:332-344).

As with all hunting and gathering peoples, the hunting strategy of the interior Southeastern Indians was not as much con-

cerned with skillfully hitting the animal from a distance as with getting close enough that it could not be missed. The primary hunting weapon was the bow and arrow, although blowguns, clubs, traps, snares, and other devices were frequently used. Hunting was usually a male occupation. The main hunting season was autumn and early winter, altough some groups had a short summer hunt.

The most important game animal was the white-tailed deer. It probably supplied between 50 and 90 per cent of the animal protein in the diet during the fall and winter. Several aspects of the deer's seasonal cycle led the Indians to hunt them successfully in late fall and winter. During the rutting season the bucks relaxed their usual defenses and became aggressive. Deer also congregated in oak forests because acorns, their favorite winter food, ripened in late fall (Hudson 1976:274-275).

The Indians either stalked deer individually using deer-head decoys and calls during the rutting season (September to November) or surrounded them with many people in the fall and winter. One type of communal hunt, the fire surround, may have helped clear the woods and stimulate the growth of meadows, thus increasing the deer population. Another type of group surround took place without the use of fire. Communal hunting declined with the acquisition of guns in the eighteenth century.

The black bear was usually hunted, as well as the wild turkey, passenger pigeon, and waterfowl. Turkeys were lured with calls and passenger pigeons were hunted in winter when they roosted in large flocks in the Southeast. Waterfowl were sought during their migrations form mid-October until mid-April. Quail

were also hunted.

Small game, including rabbits, squirrels, raccons, and opossum were also hunted by young men, often assisted by girls. Dogs were frequently used as hunting companions (Hudson 1976:272-280; Swanton 1946:313).

A chart of the subsistence schedule is presented in (Figure 2). The model of the expected settlement pattern resulting from this resource schedule in the Upper Tombigbee Valley is adapted from Bowen (1976) and illustrated in (Figure 3). While the limitations of the present investigations will not permit a full test of this settlement pattern model, it is possible to test some portions, i.e. the floodplain and the first alluvial terrace areas.

Prehistoric Interior Southeastern Indian Procurement Patterns

The archaeological evidence form several Late Archaic sites in the Midwest and Middle South confirms the applicability of Hudson's model to the interpretation of Late Archaic subsistence systems. At the Bowles (15OH13) and the Carlston Annis (L5BT5) shellmound sites on the Green River in western Kentucky, archaeological evidence has been found in a Late Archaic contest for grapes, blackberry, elderberry, and persimmon (Marquardt and Watson 1976:17). At salts cave in central Kentucky remains of the following fruits and berries have been found: blackberry or raspberry, grape, strawberry, and blueberry (Watson 1969:42-43, 53). From Mammoth Cave, Yarnell (1974:118-120) reports finding seeds of wild grapes, blackberry, blueberry, and strawberry. The remains from Salts and Mammoth Caves are from the first millennium B.C. Asch, Ford, and Asch (1972:17-19) state that evidence of grape, hackberry, and pawpaws have been found in the Archaic

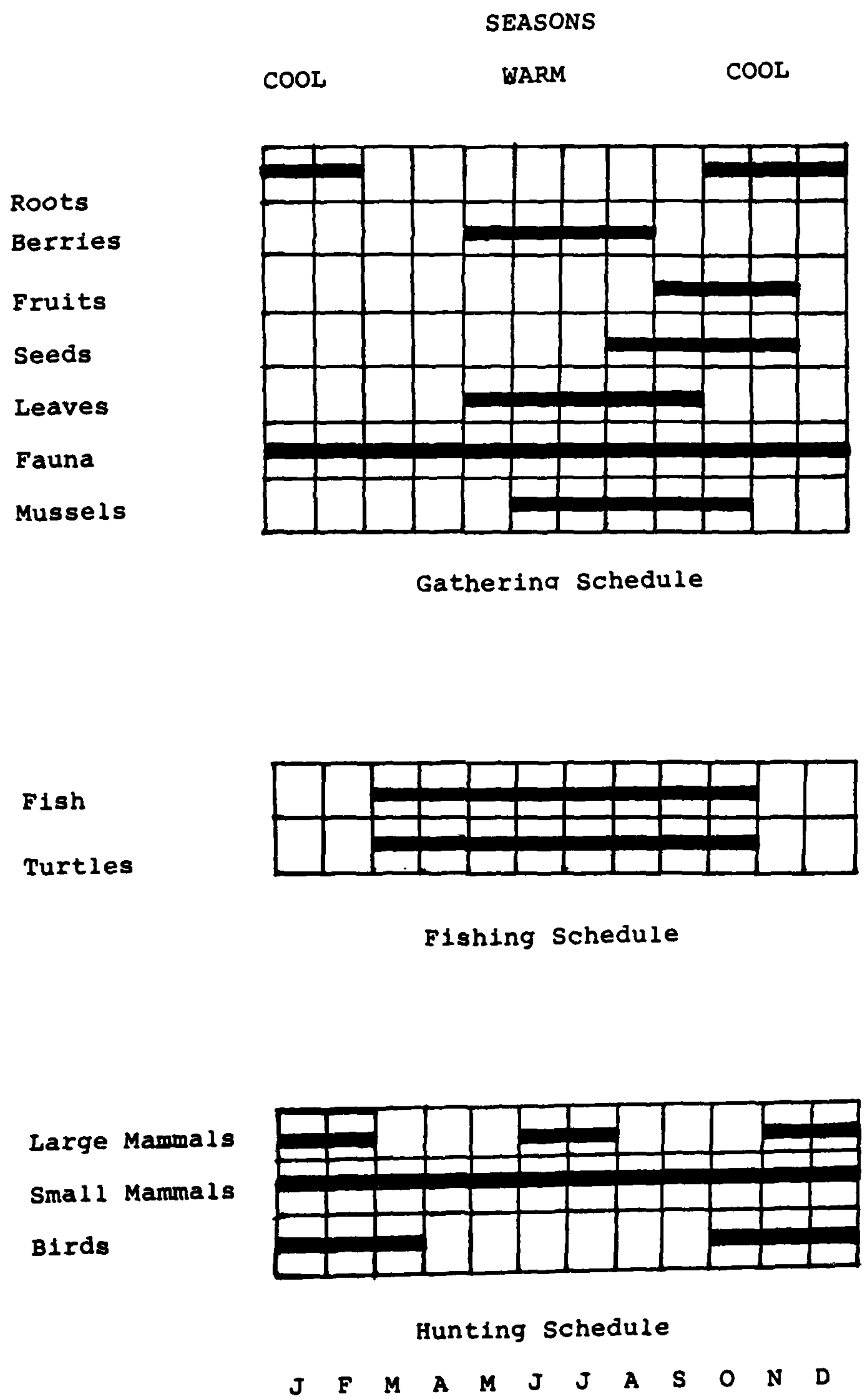


Figure 2. Subsistence schedule for the Interior Southeast

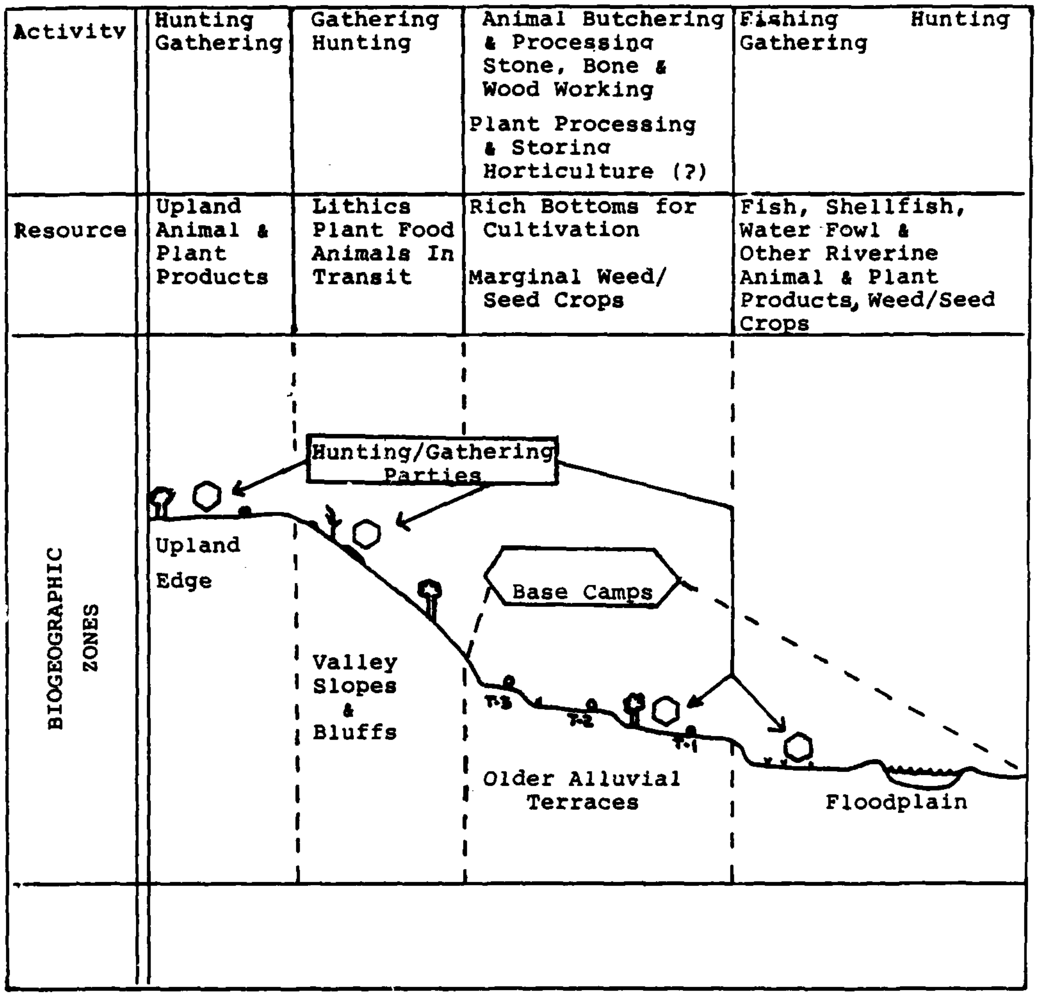


Figure 3. Hypothetical yearly subsistence model for the Upper Tombigbee Valley (after Bowen).

levels at Koster in west-central Illinois.

Asch, Ford, and Asch (1972:27) consider hickory nuts to be a firstline food item in the Archaic diet at the Koster site. Other nuts found at Koster include pecan, hazelnut, black walnut, butternut, and acorn (Asch, Ford, and Asch 1972:9). Marquardt and Watson (1976:17) recovered hickory nut shell, acorn shell and acorn meat, and walnut shell by flotation from the Late Archaic deposits at the Bowles and Carlston Annis sites in western Kentucky. At Salts (Watson et al. 1969) and Mammoth caves (Watson ed. 1974), hickory nut, hazelnut, and acorn remains were found in flotation and fecal samples.

In the Green River region of western Kentucky, Marquardt and Watson (1976) found evidence of a wide variety of aquatic wild plant seeds in the Late Archaic shellmounds. These include knotweed, partridge pea, bedstraw, and wild grasses. At Salts Cave (Watson 1969) several varieties of seeds have been identified: knotweed, panic grass, wild rice, maygrass, pigweed, and purselane. Yarnell (1974) and Stewart (1974) have also identified some of the above seeds form Mammoth Cave. Asch, Ford, and Asch (1972:12-19) recovered 20 identifiable seed types from the Koster site. These include plants that thrive on disturbed soil such as marsh-elder, goosefoot, knotweed, bedstraw, ragweed, and pokeweed. Bedstraw and pokeweed are noted as being found in talus slope forests in addition to sumac, various grasses, hackberry, honey-locust, ticktrefoil, hawthorn, Solomon's-seal, and viburnum.

Shellfish provided the Late Archaic inhabitants of the Middle Tennessee Valley with an abundant food item. Although Shellfish are a highly visible archaeological remain, Parmalee and Klippel (1974:432) note that even when "valves occur in considerable numbers, such as at many of the Archaic period shell middens in the Southeast, the animal represented a resource exploited as a supplement, rather than a staple." In the Pickwick Reservoir 56 species of water mussels, 33 aquatic gastropods, and 43 land snails have been found in the shell mounds (Morrison 1942:380). Of these, 56 varieties of mussels and 22 of land snails were evidently used for food (1942:381). Patch (1976) has also identified a variety of shellfish from the Green River shell mounds.

The archaeological evidence supports the outline of aboriginal animal exploitation derived from the ethnographic record with remarkable closeness. Curren (1974:142-143) has recently presented the frequencies of animal remains from the Late Archaic component of the Little Bear Creek site (1CT8) in Pickwick Reservoir. The analysis indicated that the white-tail deer was the most favored game animal with raccoon also frequently represented. Beaver, turkey, opossum, gray squirrel, and bobcat were also relatively abundant. In the Lower Wabash Valley, the Late Archaic Riverton, Swan Island, and Robeson Hills sites (Winters 1969:140-141) have similar frequencies in animal remains: white-tailed deer, raccoon, beaver, squirrel, elk, porcupine, opossum, bobcat, and cotton tail in order of decreasing frequency. The turkey was the most important bird to the economy. At the Indian Knoll site (15OH2) in western

Kentucky (Webb 1974:33-340) white-tailed deer, raccoon, opossum, dog, ground hog, and squirrel were found.

Archaeological evidence for fishing in the Late Archaic in the Midwest and Middle South also suports Hudson's observations (1976). However, the reader should remember that archaeologists have only recently developed the techniques necessary to collect and analyze fish remains from sites. At the Little Bear Creek site, (Curren 1974:142) drumfish was found in the Late Archaic Component. At the Late Archaic Indian Knoll site in western Kentucy (Webb 1974:339) buffalo and drumfish were found. At the Riverton culture site (Winters 1969:141) the most common fish were the bowfin, catfish, gar, drumfish, buffalo, and suckers.

Although turtles were probably not an important item in the prehistoric diet, they are a common element in archaeological sites. At the Little Bear Creek site, Curren (1974:142) lists softshell turtle and unspecified turtles as occurring in the Late Archaic component. At the Indian Knoll site, Webb (1974:33(0 found evidence of the snapping turtle. At the Riverton culture site Winters (1969:140) found the snapping turtle and the soft-shell turtle in more than a few remains.

Yarnell notes (1976:265) that:

> A list of all plants that were encouraged, tended, protected, propagated, altered, or entended in range or habitat by Native Americans in eastern North America for their own benefit would be lengthy. Included would be amaranths, carpetweed, knotweed, maygrass, maypop, milkweeds, pokeweed, purselane, Jerusalem artichoke, ragweeds, wild rice, grapes, persimmon, plums, American lotus, weet flag, Indian hemp, nettles.

Hudson (1976:294) notes that "to some extent the Southeastern Indians continued cultivating or utilizing the plants of the old Eastern Agricultural Complex, namely sunflower,

marshelder, chenopodium, pigweed, knotweed, giant ragweed, and canary grass." Although these plants were probably somewhat replaced by the cultivation of corn and beans, they were nevertheless still used as a dietary supplement. Hudson states that sunflower remained the most important of the Eastern Agricultural Complex corps. He also documents the continual usage of another of the old cultivated plants of the southeast, the bottle gourd. This was not used for food, but for "water vessels, dippers, ladles, cups, bowls, bird houses, rattles, masks, and many other things". Squash was also an important domesticated food item for the historic Southeastern aborigines (Hudson 1976:293-295).

Yarnell (1976:294) believes that the "early second millennium B.C. was the approximate time of initiation of sunflower-sumpweed domestication in the East." By the first millennim B.C. in some locations "garden produce probably achieved major significance in subsistence." This (Yarnell 1976:266) suggest that:

> There are strong indications that it was a staple food in the Late Archaic and Woodland period diets in the region from southern Illinois to Ohio and northern Alabama, especially in central Kentucky, where it appears to have been the dominant food source at times during the period of 1500 B.C. to 300 B.C. or later.

The first foreign cultigens are squash and bottle gourd which appear during the second or third millennium B.C. according to Yarnell (1976:266). The early squashes were apparently similar to gourds and were probably used primarily as continers, (Watson 1974:234), although the seeds were also eaten (Yarnell 1974:118-120). Both the gourd and squash were introduced from Meso-america. By the Late Archaic in the Midwest and Middle South, five garden plants were in use: sunflower, sumpweed,

chenopod, squash, and bottle gourd. According to Watson (1974:234) the picture of Late Archaic and Early Woodland diet from the Mammoth Cave area is a "fairly steady plant food diet focused on hickory nuts, sunflower, sumpweed, and chenopod seeds with other seeds and occasional fruits in season."

SETTLEMENT PATTERNS

Based on the principle of least effort (Zipf 1949), the law of minimum effort (Losch 1954) or the minimax model (Plog and Hill 1971), we assume that activities were carried out at locations so as to minimize the effort (energy) to complete specific tasks. This relationship forms a framework within which locational, ecological, and behavioral variables can be interpreted. Efficiency can be measured by comparing the amount of energy expended to the amount of energy captured during a specific set of activities. This is simple input-output analysis. A basic assumption is that people carry out particular activity sets at particular locations because this is most efficient.

Klinger's settlement model (1978) for hunters and gatherers describes four basic types of camp sites: (1) winter-spring base settlement, (2) winter-spring specialized activity sites, (3) summer-fall base settlement, and (4) summer-fall specialized activity sites. Descriptions of these site types and of the expected associated artifact assemblages are given below.

The cool season base camp will be located in an area best situated for the efficient exploitation of raw materials. Such an area will be within the overlap of several procurement spheres. The artifact assemblage associated with such a base

settlement should include most of the variability represented in the technology; male and female oriented tool assemblages will be found in addition to tools and structural features thought to indicate acute and steep angled end scrapers, adzes, side scrapers, backed and true blades, projectile point/knives, gravers, abraders, choppers, prforms, hammerstones, cores, primary and secondary decortication flakes, bifacial thinning flakes, debitage, ground and pitted cobbles, and fire cracked rock. The band may shift its base settlement during this time. The base camps will be occupied by several families, with total population averaging between 25 and 100 individuals (Klinger 1978).

The cold season specialized activity area will exhibit a relatively narrow range of artifact variability depending on the type of site. Quarry sites should contain artifacts associated with the selection and primary reduction of material and will contain waste and other debris in addition to hammerstones and aborted preforms. They should be located at or adjacent to suitable material. Hunting and butchering sites should exhibit an absence of general tool classes: edged cobbles, notched slab abraders, slab abraders with large grooves, backed blades, acute edged end scrapers, adzes, point preforms, and point production stations. Nut and berry gathering camps may not contain preserved artifacts and therefore fall below the level of archaeological visibility. Root gathering camps may exhibit a limited range of preserved tools: stone bits for digging sticks or adz or adz like tools, and polished and striated bit chips.

Warm season base settlements are composed of families that

have broken away from minimal band groups. After the minimal band groups break up into family groups, they migrate throughout the band territory exploiting microhabitat resources. The resulting base settlement will be identical to the cool season camps in all respects except for lowered artifact densities and possible midden development. The range of behaviors is generally the same as the cool season base settlements.

The warm season specialized activity sites associated with warm season base camps should have the same artifacts and locations characteristics as those activity camps associated with cool season base camps: the two types may not be distinguishable.

TECHNOLOGY

Steward (1955:40-41) suggest that the relationship between human behavior and environment may be studied by analyzing "the interrelationship of exploitative or productive technology and environment...," specifically the "...behavior patterns involved in the exploitation of a particular area by means of a particular technology." Such subsistence activities are part of the economic structure of a culture, which is archaeologically highly visible. In this study, therefore, technology will be viewed as that part of the economic subsystem through which man adapts to his environment.

The primary concern of our lithic analyses will be to infer the behavior of people as they adapted to the environment. To accurately describe specific technological adaptations we must define the processes used in stone tool production. We are fortunate that the durable nature of stone gives the lithic tech-

nological subsystem high archaeological visibility. This visibility, combined with the subsystem's long and integral affiliation with subsistence, makes it possible to formulate models of diachronic adaptive change in subsistence behavior.

Deetz (1967), Collins (1975), and Bradley (1975), among others, note that lithic technology is a reductive process which extracts raw material from geologic contexts and transforms it into the desired end products, the stages and techniques employed in various reduction sequences must be determined. This may be accomplished by inferring procedural modes from technological analyses (Rouse 1960; Gillespie 1977). Inferences based upon these analyses form the basis for constructing testable models of prehistoric tool manufacturing and concordant activities. This technological method can be employed for the entire prehistory of the Upper Tombigbee Valley. In order to understand the implication of these behavioral patterns, it is necessary to place specific assemblages in their proper context. Ford (1954) states that historical documentation must occur before an adequate understanding of processual events may take place. Accordingly, only lithic materials from known historical contexts should be considered in formally defining flaked stone technology models.

Within this general framework, the specific technological analysis of this project's materials will be based on principles developed during recent investigations in the adjacent Bear Creek drainage of the Tennessee Valley. In addition, models of flaked stone tool manufacture developed for the Central Tombigbee Valley are presented. These may or may not be applicable to the Upper Tombigbee Valley, but will be tested using alternative models.

One of the concepts we will use in this project is a general manufacturing model based on set theory. Four hierarchical concepts will be used to describe manufacturing processes. From least to most inclusive they are: operation, step, practice, and technology. The use and the definition of some of these terms was developed for ceramic analysis by Richard Krause (personal communication). As defined below, the terms should be appropriate for any manufacturing process.

The lowest order term is <u>operation</u>, defined as the minimal combination of hand and tool movements producing an observable result. Examples in flint knapping would be a blow with a hammerstone or a stroke with an abrader. Any combination of a single repeated operation or set of operations is a <u>step</u>. An example of a single repeated operation would be shaping a core with a hammerstone, while a repeated set of operations would include such things as serrating a blade edge using pressure flaking and edge abrasion. A <u>practice</u> is the set of operations or steps which acount for the manufacture of an artifact or artifact type. <u>Technology</u> is the most inclusive term and is defined as any set of related practices. Technology is a flexible concept, because practices may be considered related by one or more of many criteria including use, form, raw material, method of manufacture, and cultural association.

One principle that will guide our analysis is the recognition that aritifacts are the products of organized human behavior, and one of the goals of analysis should be to account for the behavior. With this principle in mind, an organizational, analytical framework shuld be developed to create

and order categories of material within a logical sequence of possible manufacturing steps. This means that a specimen may have passed through all prior steps, or only some of them. There are many possible alternative procedures at different manufacturing steps. The consistent selection of one alternative, or set of alternatives is the major factor in technological variability.

The end product of such an analysis should be transformations or trajectories of artifact manufacture. Such statements should specify starting points, operations, and outcomes which account for the observed materials. This is certainly a large and difficult task, and no claims are advanced that these goals will be fully met; but such goals do reflect the overall concepts within which this analysis was conceived, and are the end to which it will be directed.

Note that within this framework, technology and morphology, not artifact use, are the criteria for establishing categories, even though some of the selected taxons, such as "drill," may imply use. Once the materials are sorted, evidence of use will be sought within the categories. The analysis progresses as follows: establishing manufacturing operations and finished tool categories, ordering these in a logical sequence, sorting the specimens into categories, and attempting to determine the artifact use or uses.

This procedure has an analytical value that goes beyond morphological description. Not only does it categorize the artifacts morphologically, but it also accounts for the human activities which produced them. The thoroughness of this procedure is

directly proportional to the completeness of teh manufacturing procedure.

General Models of Lithic Manufacture Processes in the Central Tombigbee Valley

The basic technological subsystems: acquisition, processing/ manufacturing use, and discard are placed into a reductive lithic technology model. By using data from the Central Tombigbee drainage we can postulate a series of lithic reduction sequences. These are presented below in narrative form.

The cultural and historical stage, archaeological culture, phase, or subphase designated for each lithic technology is presented where possible. These are localized lithic technological traditions which persisted throughout the prehistoric periods in the Central Tombigbee Valley. Roughly, this area extends from Demopolis, Alabama to Columbus, Mississippi. This information will serve, in part, as a data base from which we may compare and contrast assemblage/technological variation between regional traditions.

Raw Material Acquisition

Lithic sources available to the prehistoric inhabitants can be separated into two arbitrary divisions based on the spatical distribution of these materials. Local chert materials were designated as those occuring within 25 km of the Central Tombigbee Valley. Non-local or exotic stone materials are those with occur at a distance greater than 25 km.

Local Procurement: The etic model of siliceous stone procurement allows for differential acquisition practices based upon socia

and geologic availability of the resource. Local Tuscaloosa formation gravel occurs in the alluvium of the Tombigbee flood-plain. In order to acquire this material the Indians needed only to find an exposed gravel bar and pick up the desired pieces. Thus, collection of chert gravels is a practice inferred from the numerous intact chert gravels found on archaeological sites. There is little evidence of modification of the local materials prior to transport. Local procurement is shown on the upper left hand section of the flow chart (Figure 4).

Regional Procurement: Siliceous materials which had to be procurred from distant source areas were available in gravel deposit and outcrop (bedrock) form. Tallahatta quartzite, Ft. Payne chert, Bangor chert, and Camden chert occur at distances of greater than 25 km from the Central Tombigbee Valley. Raw materials were directly or indirectly obtained from these sources. Quarrying may have been an alternative for obtaining siliceous materials. This could be the first step in the regional acquisition process and could have been accomplished by the Central Tombigbee people or by those who lived near the quarries. If kin groups living near the source areas quarried the material and exchanged it with outher groups, then this exchange or gift would be the first step in acquition.

After quarrying the material it must be transported, either as it is or after initial modification. This is depicted in the flow chart (Figure 4) for both the local and regional (non-local) sources. Modification could involve termal alteration, which would reduce it into a usable product or a form suitable for long

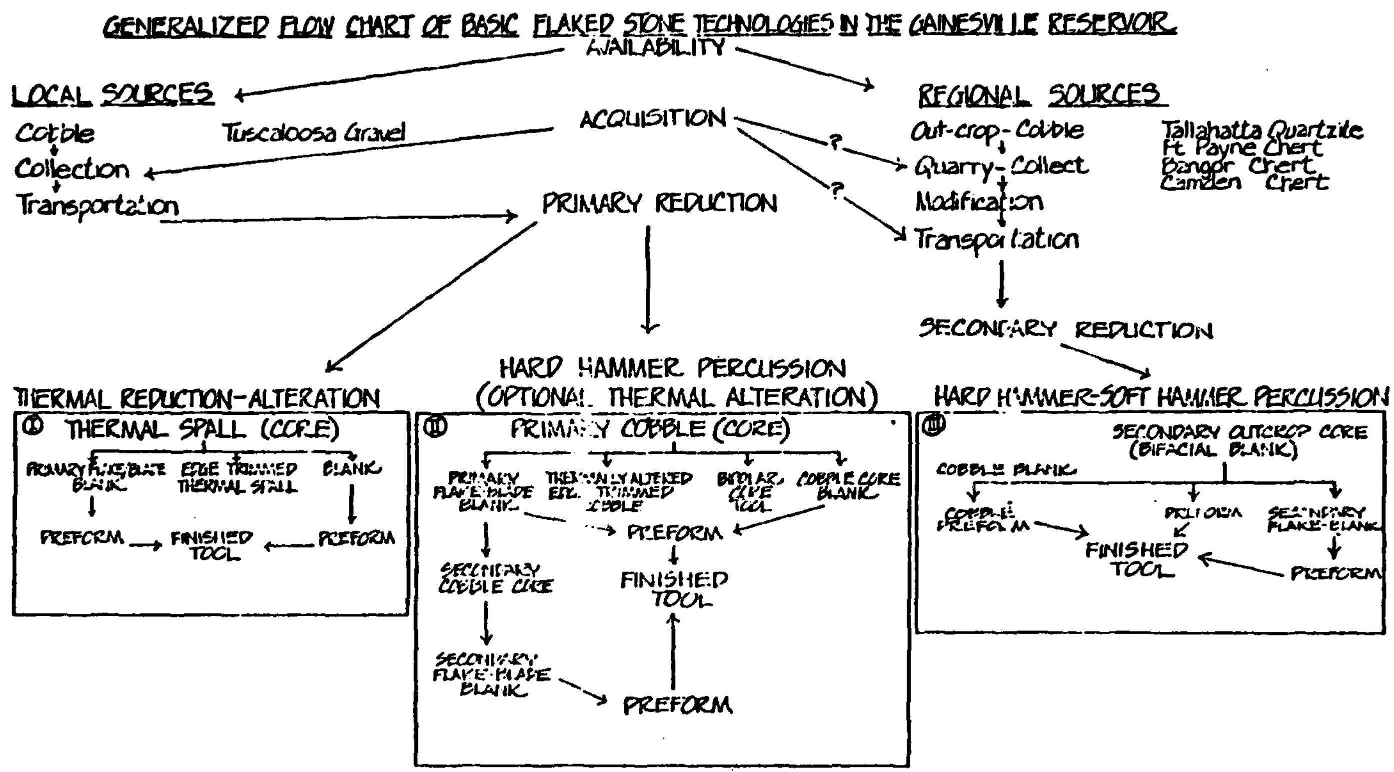


Figure 4. Generalized Flow Chart of Basic Flaked Stone Technologies in the Gainesville Lake Area.

distance transportation.

We may develop two technologically distinct alternate modes of procurement to account for the presence of non-local Tallahatta quartzite and other siliceous stones. The reduction of Tallahatta quartzite involves a core and blade industry with an emphasis on producing large bifacial blanks for transport. The northern Alabama reduction sequence is imperfectly understood because it is based on the Bangor and Ft. Payne cherts. The procurement and reduction of Tuscaloosa formation gravels, especially Camden chert, evidently involved a rigorous system for producing preforms and heat treating and reducing them into projectile point/knives and other tools (Futato 1980).

Reduction Sequences

Regardless of the initial steps in acquiring the siliceous material, three distant methods may be inferred for further reduction once it arrived at the camp or habitation site. These are listed on Figure 4 as (1) thermal reduction/alteration which includes only local chert cobbles; (2) primary hard hammer reduction (optional heat alteration) which applies mainly to local cobble materials; and (3) secondary hard hammer/soft hammer-percussion, which pertains almost exclusively to non-local materials. These three technologies are not mutually exclusive in terms of cultural and historical periods, although some were emphasized more than others in some periods. Shifting emphases may be detected that relate to unknown social and physical factors in the environment (Ensor 1980a).

<u>Reduction Sequence I--Thermal Recuction/Alternation</u>: Once local gravels had been collected, the materials evidently underwent

extensive firing. Use of fire to reduce chert cobbles into a usable form has been noted by Gregg and Grybush (1976:190): "often the purpose of the heating was to facilitate the fracture or cleavage of small cobbles or pebbles of source material so that they can be worked".

Crabtree and Butler (1964:2), Purdy (1975), Mandeville (1973:171), and House and Smith (1975) have all noted that severe damage occurs to siliceous materials when subjected to high temperature (Ca. 500°). How the temperature is raised also has an effect upon the amount and degree of thermal damage (Purdy 1975).

Experiments in firing local Tuscaloosa gravels are informative because we can use them to infer the heat alteration practices of Middle and Late Woodland groups. Such properties as thermoclastic changes, textural and structural morphologies, and color changes were noted. Using the macroscopic criteria of severe potting, crazing, fracturing, and general cobble explosion produced during these experiments, we can assume that prehistoric thermal reduction/alteration took place within Middle and Late Woodland contexts in the Gainesville Reservoir. The problem lies in ascertaining if the thermal reduction/alteration occured intentionally (Gregg and Grybush 1976) and if so, what the intended use of the termal alteration was. Anderson (1979) notes that intentional thermal alteration in the Southeast tends to be associated with advanced stages in tool manufacture, soft as opposed to hard hammer flaking, biface manufacture, and fine workmanship (primarily pressure flaking). He states (1979:227) that intentional thermal alteration may occur for one or more of the following reasons: (1) specific appearance, (2) improved

quality, (3) sharper cutting edges, (4) soft hammer or pressure flaking efficiency, or (5) raw material conservation.

Of the five reasons offered by Anderson, we may add one additional possibility. In the ethnographic record people are known to have thermally reduced small cobbles and pebbles. The quantity of fire-cracked chert, the obvious selection and use of thermal spalls by Middle and Late Woodland groups, and the paucity of cores in certain Miller III assemblages suggest that reasons for thermal alteration include chert reduction (Ensor 1980b).

Although Purdy (1975:40) and Anderson (1979) indicate that a slow temperature rise is needed to thermally alter chert into a usable form, our experiments contradict this hypothesis and suggest that heat treatment may occur as a secondary result of intentional thermal reduction practices. Depending upon the chemical and structural properties of the chert, quick, intense heat will result in shattered heat spalls which are suitable and even desirable for further modification into certain tool forms. Electron microscopy indicates that internal structural changes may occur in heated Tuscaloosa gravels (Ensor 1980a).

Thus intentional termal reduction would have several advantages. These are: (1) providing an easy method of initially reducing the cobble; (2) reducing the tensile strength, making secondary reduction feasible; (3) producing sharper edges on flakes; (4) eliminating internal flaws; and (5) creating striking platforms on thermally fractured surfaces. Of the five reasons given by Anderson, it appears that at least two are relevant to interpretation of Middle and Late Woodland lithic technology in the Central Tombigbee drainage. Thermally altering the material increases its quality, especially for pressure flaking. Sharper cutting edges were possible due to the glass-like nature of much of the heated stone. Improved flaking quality and ease initial local chert reduction were the two overriding considerations of the prehistoric Middle and Late Woodland flint knappers. This technology is indicated on the lower left side of the flow chart (Figure 4). Secondary reduction practices, also depicted, are thought to occur after thermal reduction.

The reduction in size of Miller III arrow points, when compared to Miller II projectile points, suggests that there also may have been a reduction in flake size from Miller II to Miller III. Such a decrease might indicate tha heat spalls or other small objects were being reduced, lending futher support to the hypothesis that thermal reduction was being practiced.

In order to test flake size differences produced by Woodland groups, a sample of secondary decortication flakes was screened through three mesh size. Flakes which were retained in the 1 inch, 1/2 inch, and 1/4 inch mest were counted for each feature. Selected feature proveniences from Sites 1GR1x1, 1GR2, and 1P161 were chosen to represent Miller II and Miller III occupations. These features were undisturbed and debitage from earlier components appeared to be negligible. The frequency of each flake size by cultural provenience was tabulated for each site. Few flakes were caught in the one inch mesh and were not quantified. Flakes caught in the 1/2 inch and 1/4 in ch mesh were quantified by site and cultural phase attribution and placed into 2 by 2 contingency tables (Figure 5). The null hypothesis for the independence of the two variables was stated for the sites as follows: H_o - There is no significant difference between secondary decortication flake size for the Miller II and Miller III cultural phase attributions at sites 1GR1x1, and 1GR2, and 1P161.

The chi square distributions suggest that there is a significant difference in the flake size between the two phases because the critical value of 3.84 for one degree of freedom at the 5% confidence level is surpassed in each instance. The significant values reached at all three sites lend further support to the contention that there are differences in secondary decortication flake size between Middle and Late Woodland societies in the Central Tombigbee drainage.

A reduction in flake size may indicate several things. First, reduction could indicate that there was an overall decrease in the size of the piece being reduced. If thermal

SITE 1GR1x1

Cultural Phase

Flake Size		M-11	M-111	
	½"	21	24	45
	¼"	144	410	554
		165	434	599 = Total

$x^2 = 8.91,\ p<.05,\ d.f. = 1$

SITE 1GR2

Cultural Phase

Flake Size		M-11	M-111	
	½"	32	9	41
	¼"	110	201	311
		142	210	352 = Total

$x^2 = 27.41,\ p < .05,\ d.f. = 1$

SITE P161

Cultural Phase

Flake Size		M-11	M-111	
	½"	165	28	193
	¼"	849	455	1304
		1014	483	1497 = Total

$x^2 = 31.96,\ p < .05,\ d.f. = 1$

Figure 5. Comparison of secondary decortication flake size for Miller II and Miller III phases.

reduction was taking place, then the use of a thermal spall as an objective piece could account for the observed decrease in flake size. The use of small cobbles also would have been possible with the substantial decrease in size of finished products (arrow points).

This tends to substantiate the hypothesis that Middle and Late Woodland lithic technologies were different. Thermal alteration took place in over 80% of the Middle Woodland material and in 90% of the Late Woodland material. Intentional thermal reduction evidently became a favored technique of initial cobble reduction during Late Woodland times. The initiation of this practice could go back as far as the Miller I phase and thermal alteration certainly took place in Miller II times as an intergral part of their adaptation to the local chert materials.

Reduction Sequence II - Primary Hard Hammer Reduction - Optional Thermal Alteration: Within this mode of reduction (Figure 4) we have two related practices which differ in technique: primarily in the nature of the percussor and support base used in the reduction process and in the presence or absence of thermal alteration. The first practice involves an optional thermal alteration step which was carried out prior to reduction. Cobbles were heat treated, but thermal facture or damage was not induced. The desired end product was evidently an intact thermally altered cobble which could be bifacially reduced or a sharp bifacial or unifacial edge that could be created quickly. Indeed, much of the flaked stone tool assemblage during Middle and Late Woodland times in the Central Tombigbee drainage con-

sists of bifacially flaked edge trimmed cobbles (Ensor 1980a). Although hard hammer flaking was apparently predominate in reducing heated cobbles, soft hammer and pressure flaking were undoubtedly used to some extent. Hard hammer percussion removals generally leave deep, irregular, conchoidal scars. Soft hammer and pressure retouch generally leave more regular, thin, conchoidal scars.

In this sequence, as depicted on the lower central portion of the flow chart (Figure 4), percussion flaking a thermally altered cobble would produce either a core tool or edge trimmed cobble, a primary flake-blade blank, or a cobble core blank or preform. Numerous cases exist where heated cobbles were used as primary cobble cores from which primary flake-blade blanks were struck. These were either used in this state or further reduced into unifacial and bifacial implements. Occasionally the original heated cobble would be separated into two or more secondary cobble cores. These would then be used to produce secondary flake-blade blanks.

Reduction Sequence III - Secondary Hard Hammer/Soft Hammer Percussion: This technology is depicted on the right hand side of the flow chart (Figure 4). It is primarily the product of procuring siliceous stone from the Tallahatta formation. A hypothetical model has been generated to account for the distribution of this material in the Central Tombigbee drainage (Ensor 1980c). This hypothetical sequence is based on an analysis of debitage and other tools from a Tallahatta quartzite quarry and caches of large bifacial blanks and cores found in the Central Tombigbee drainage. Although the specifics of this technological system are not fully understood, the following generalized model is postulated.

Large pieces of Tallahatta quartzite were quarried, quartered, and trimmed to produce prepared cores. Large thick blades were roughly parallel to triangular laterial margins and several arises on the dorsal surface were produced from these cores. The striking platform for the most part was retained. The blades were then flaked to produce regular, symmetrical bifacial preforms and blanks (secondary cores). The preforms were then further reduced to produce finished tools, transported to habitation sites, and exchanged either within the local group or with members of an outside group. Eventually, the blanks and other forms were brought to the Central Tombigbee Valley either by a system of kin group exchanged or direct procurement (quarrying). They were further reduced, exchanged, or used depending upon the state of material once it reached the reservoir. Further reduction of the large quarry-blanks (bifacial cores) would involve the production of secondary

flake-blanks for further reduction into a finished product. This system is depicted on the extreme lower right portion of Figure 4.

Procurement of Bangor and Ft. Payne cherts would probably be similar because they also occur in thick outcrops.

There is also evidence that non-local Tuscaloose gravels were being procurred, especially large nodules of the Camden variety. The low incidence of heated flakes to non-heated flakes in Archaic strata coupled with the high incidence of thermally altered projectile points suggests that projectile point manufacture was undertaken at specialized localities.

Futato (1980) and DeJarnette et al (1975a) note a distinct Archaic reduction sequence for biface manufacture in the Cedar Creek and Buttahatchee watersheds to the north of the Central Tombigbee Valley. In this sequence, described later, cobbles were bifacially flaked into preforms and thermally altered. Further reduction into finished flaked tools then took place. Thus, initial biface reduction and/or thermal alteration may have taken place outside the Central Tombigbee drainage. This sequence would involve collection, reduction into preform state, thermal alteration and secondary reduction into a finished tool, and transportation. This is depicted on the lower right side of the flow chart (Figure 4).

Summary of Cultural and Historical Reduction Sequences

Reduction Sequence I involves the use of intentional thermal reduction/alteration and was confined to the Woodland (Miller) and Mississippian (Moundville) components. Specifically, thermal

reduction was practiced during these subphases: Late Miller II (Turkey Paw subphase), early Miller III (Vienna subphase), Middle Miller III (Cofferdam subphase), Late Miller III (Catfish Bend subphase), Terminal Woodland-Early Mississippian (Gainesville subphase), and Moundville (I, II and III subphases). Reduction Sequence II primarily involves the use of hard hammer percussion with or without thermal alteration, and was used throughout the prehistory of the Central Tombigbee drainage. The use of heat to alter raw material during the Woodland and Mississippian stages and of bipolar flaking to produce core tools during the Archaic is the basic difference between these cultural stages. Both the Archaic and Woodland groups thermally altered cobbles and bifacially flaked them into projectile point/knived. Recuction Sequence III deals primarily with Tallahatta quartzite; its procurement, transportation, and secondary reduction. This sequence was evident during Middle Archaic (Vaughn) times (Ensor 1980c), but other Archaic, Gulf Formational, and Middle Woodland groups also used this reduction.

The reduction sequences identified in the Central Tombigbee Valley will serve as models from which testable hypotheses can be generated for our current investigations. In addition, recent work in the Cedar Creek drainage system will be utilized in the same matter. The cedar Creek drainage is tangent to the Mackeys Creek drainage whihc is within the Upper Tombigbee Valley. While we do not expect a one-to-one correlation of any previous technological models to reduction sequences used in the Upper Tombigbee Valley, they serve as the logical starting point from which to operate.

The Cedar Creek Biface Model: The Cedar Creek lithic technology model accounts for certain catagories of chipped stone bifaces by ordering them in a manufacturing sequence (Futato 1977c, 1980). This model is decribed below:

Core. The category core contains pieces of chert from which flakes have been removed, with insufficent modification to conform to another category.

Preform 1. The Preform 1 category contains thick artifacts with rough, ovoid to triangular outlines. The artifacts show no, or minimal, secondary flaking. The large, thick detached flakes and the large negative bulbs of percussion indicate flaking by direct, hard hammer percussion. Unflaked areas are usually present on one or both surfaces.

Preform 2. These artifacts are similar to Preform 1 artifacts, but show some secondary flaking. As a result they tend to be thinner and to have a more regular outline. Unflaked surfaces are present, but less common than in the above group.

Biface Blade. This group contains thinned, retouched, ovoid to triangular bifaces. Edges are regular and unflaked surfaces are rare.

Projectile Point/Knife. The catagory Projectile Point/knife (PP/K) contains two types of artifacts which are distinguished from biface blades in two ways. The first type contains PP/Ks which have a haft element as defined in the attribute list for projectile point analysis in the Bellefonte report (Futato 1979). The second group contains the PP/Ks without haft elements. They are seperated from the biface blades by size and shape or by flaking. The latter criterion is less objective but may be

characterized as the presence of small, regular, retouch flaking on the edges, probably done by pressure.

Reworked PP/K. This category includes several artifact types which are considered because of size and flaking to have been manufactured from PP/Ks. Examples include drills and hafted end scrapers.

In this sequence, reasons for placing the categories in the given order are only stated for preforms and biface blades. The two initial steps, production of a core and of a Preform I, can be inferred. By definition, a core is a core. If a Preform I is the first recognized state in biface manufacture, then at some previous time, when less flaking occurred, the specimen would have been classified as a core. These steps were therefore deleted from consideration.

The steps in the process after biface blade production were also not dealt wi- . PP/Ks are considered biface blades that have been further reduced, and inspection of metric data shows that specimen size in the two categories is consistent with this. The final steps, such as those in the manufacture of a drill, are not considered because they may, in mose cases, be described simply as specialized blade modifications.

If these categories represent a manufacturing sequence, two outcomes can be expected. First, the specimens in each successive category would be smaller because the technology is subtractive. Second, given the concept of mental templates, increasing standardization was expected. This was tested by two hypotheses.

Hypothesis I. The mean and the range of the length, width,

thickness, and weight become successively smaller for the artifacts in the categories Preform 1, Preform 2, and biface blade.

Hypothesis 2. The standard deviation of the length, width, thickness, and weight becomes successively smaller for the artifacts in the catagories Preform 1, Preform 2, and biface blade.

An examination of metric data by the ratio and the relative standard deviation indicated confirmation of the hypotheses. The relationships of the variables relative to the hypotheses from one site are shown graphically in Figure 6, 7, 8, and 9.

It would be clear that this is a potential sequence, with alternatives, through which artifacts may pass. One of the most common alternatives encountered in the Cedar Creek material is that a flake of suitable size and shape could be used as the starting point at each step in the process. For example, a Preform 1 may be flaked from a core or a suitable flake; a Preform 2 may be flaked from a Preform 1 or a suitable flake; and so forth.

The artifacts from 1FR311 and 1FR590 classified as preforms and biface blades were examined for evidence of heating (Table 1). The examination was limited to the red and yellow cherts because identification of heat treating on the other major chert types is not yet secure. The presence or absence of heat treating was classified as one of three possible alternatives: Not Heated, Probably Heated, and Heated. The first class contains artifacts made of yellow chert. The second artifacts with the traits indicative of heating, such as red color and/or glassy

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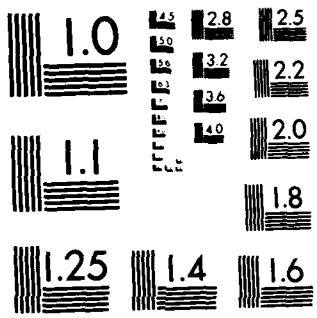


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

or ripples flake scars. This indicates that these artifacts have been heated, but not necessarily as part of the manufacturing process. The final class contains those artifacts which show evidence of having been heated during the manufacturing process, i.e., after some flaking was done. Evidence of this was taken to be the presence of surfaces flaked before heating, and contrasting surfaces exposed either by breakage or flaking after heating. Once all surfaces exposed prior to heating are removed by subsequent flaking, it is no longer possible to classify artifacts as belonging in the Heated class. This class was used to evaluate the possible occurrence of heating of chert either before or after manufacture by natural or accidental causes or those causes incidental to artifact use.

Table 1 Heat Treating of Yellow Chert: Preforms and Biface Blades

1FR311				
Category	Heated	Probably Heated	Not Heated	Other Chert
Preform 1	6	6	20	39
Preform 2	4	10	6	32
Biface Blade	1	22	1	63

1FR590				
Category	Heated	Probably Heated	Not Heated	Other Chert
Preform 1	4	4	10	25
Preform 2	11	0	0	27
Biface Blade	0	2	0	53

Figure 6. 1FR311, Length of Preforms and Biface Blades, in Millimeters.

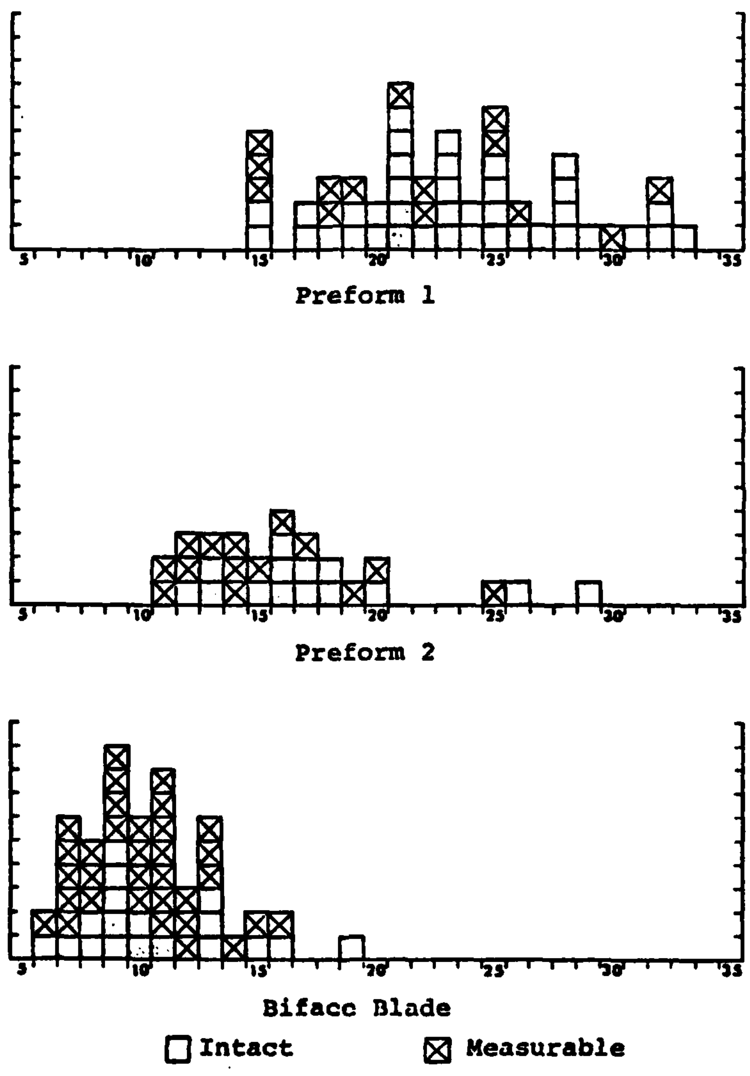


Figure 7. 1FR311, Thickness of Preforms and Biface Blades, in Millimeters.

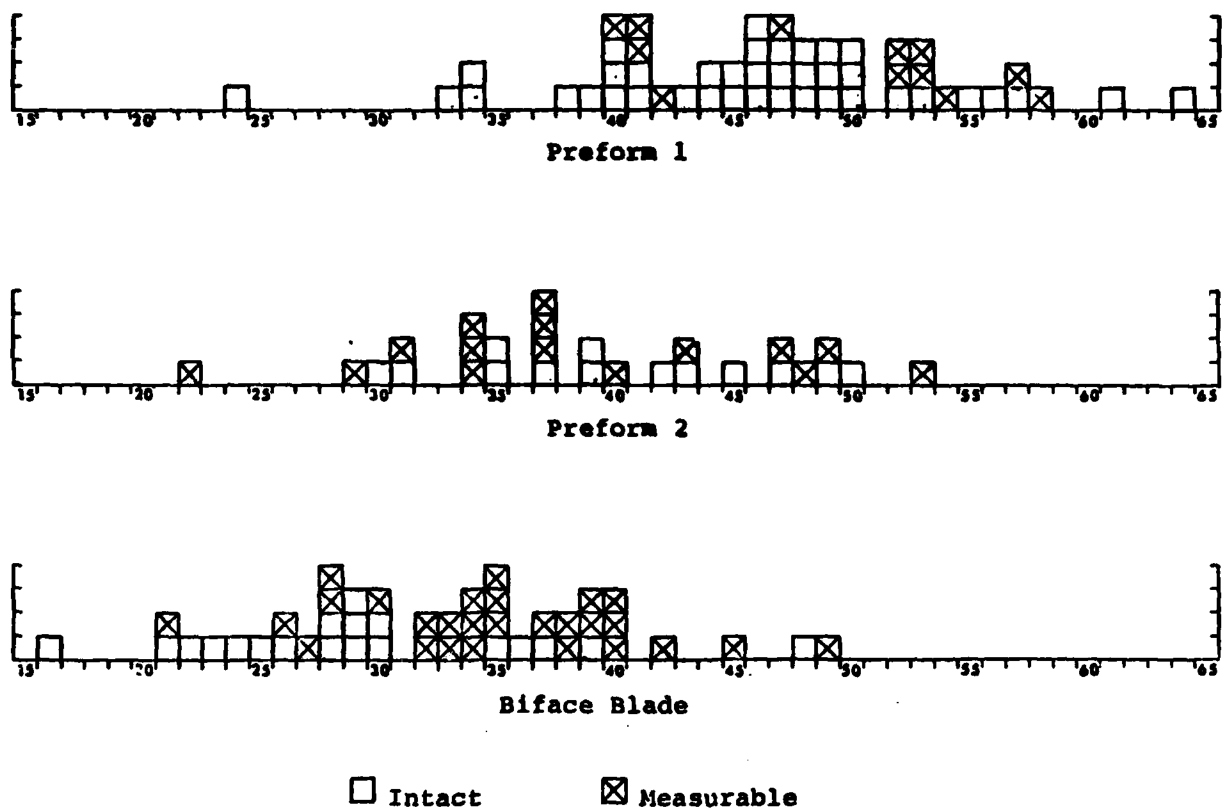


Figure 8. 1FR311, Width of Preforms and Biface Blades, in Millimeters.

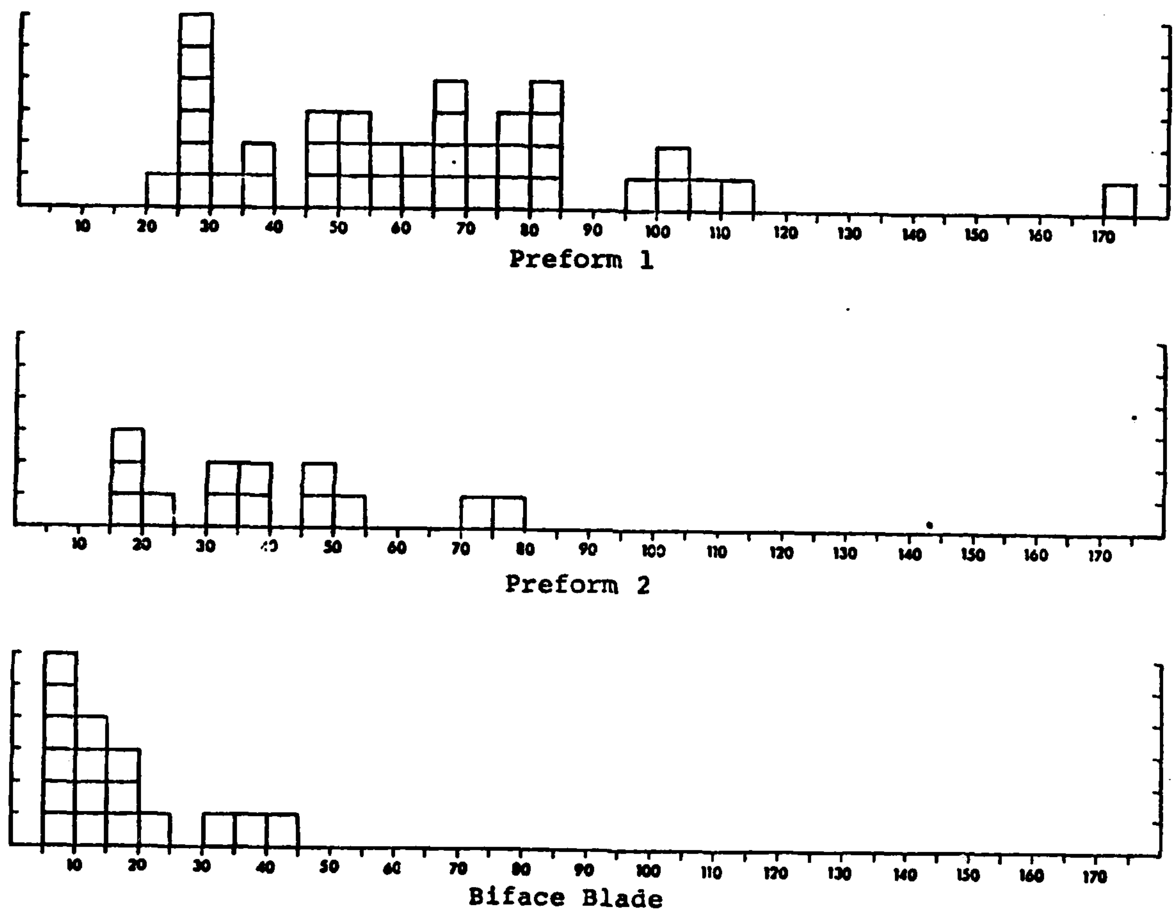


Figure 9. 1FR311, Weight of Preforms and Biface Blades, in Grams.

The study was limited to the production of preforms and bifaces because this seemed to be the step at which heating took place. Familiarity with the materials indicated that nodules or cores were not being heated, and support was later gained form this. On the other hand, unheated PP/Ks of yellow chert are rare. Two were found at IFR311, and none at IFR590. The same division of chert types by artifact type has been noted for the Bear Creek Watershed and nearby areas with similar raw materials (DeJarnette et al. 1975b, Hooper 1968, Josselyn 1965, Nielsen 1971, Stowe 1970).

Assuming that the Heated and Probably Heated classes both represent artifacts heated during manufacture, the data in Table I may be grouped in a four cell matrix for each site (Figure 10); heated and unheated, preforms and biface blades. At IFR311, half of the 52 preforms are heated and half are not, but only one biface blade out of 24 has been heated. Two thirds of the preforms from IFR50 have been heated (19 of 29). The sample of biface blades contains only two specimens, both heated. (This low figure is caused in part by the large proportion of biface blades of fossiliferous Bangor chert on the site; 71 per cent compared to 31 per cent at IFR311. The significance of this difference is not yet known.)

During analysis, no artifact classified as a Preform I that had been heated prior to manufacture was found. Unless contrary evidence is found on later excavations, it is safe to assume that raw materials blanks were not being heated.

Additional qualitative evidence for the heating of preforms is found in analysis of the debitage. During debitage sorting,

Figure 10. Heat Treating of Yellow Chert: Preforms and Biface Blades

	1FR311 Heated	1FR311 Unheated			1FR590 Heated	1FR590 Unheated	
Preforms	26	26	52	Preforms	19	10	29
Biface Blades	23	1	24	Biface Blades	2	0	2
	49	27	76		21	10	31

flakes which exhibited both pre- and post-heating flake scards on their dorsal surface were noted.

Considering all the data, it seems that heat treating of yellow chert was an integral part of the lithic technology in the Bear Creek Watershed. The heating ordinarily took place during the Preform I stage, or was delayed to the Preform 2 stage. Heating cobbles prior to flaking does not seem to have been practiced.

While this model deals with certain bifaces, it is being expanded to include other chipped stone tools, such as unifacially flaked tools, and the artifact categories have been set up with this goal in mind. As an example, the uniface scrapers from Cedar Creek have been placed into a classification system with 36 potential groups based on the intersection of: (1) orientation of working edge - side, end, or combination; (2) blank - blade or blade like, expanding, or other; (3) flaking - marginal retouch only, or other; and (4) presence/absence of graver spurs. Thus, the classification may be used within a uniface production model.

One preliminary observation made on the Cedar Creek material is that this classification documents the decreasing amount of preparation of scrapers from Paleo-Indian through Woodland.

It seems from the data of the midden mounds (Bense 1979 a,b,c,) and from examination of materials from a quarry/workshop located a few miles north of Fulton, Mississippi (22TS1023) that the Cedar Creek model will be applicable to the materials from the midden mounds. In Cedar Creek, these activities were carried out in the base camps. This difference is probably due to differential availability of chert in the two areas. The second

difference is that the use of flake blanks as opposed to core blanks appears to be more frequent in the Upper Tombigbee Valley. This may be due to larger cobble size in the latter area.

Based on the Cedar Creek model, preliminary work in the Upper Tombigbee Valley, and work in the Gainesville Lake area (Ensore 1980c), a three part model may be offered for the manufacture of chipped stone bifaces from Tuscaloosa gravel, based on size of the raw material: (1) a flake blank model when the raw material is large enough; (2) a core blank model form small cobbles, and (3) a bipolar/thermal reduction model for smaller cobbles.

Other Technological Industries: In addition to the use of stone in the manufacture of lithic artifacts, other materials were used to produce tools. Following the general model of manufacturing processes developed by Futato (1980) and Krause (1978) the behavior which went into their manufacture may also be described. The manufacturer of bone and shell tools may be viewed as a reduction technology. Since so few artifacts of this nature are expected, due to the preservation characteristics of the soil, a detailed model to account for their presence is not developed here. If these materials are recovered in sufficient quantities to warrent such an analysis, a formal description of their manufacture will be generated.

The four models of reduction sequences and their behavioral implications presented in this section will be tested in this study. The methods by which these models were developed is as important as the models themselves. This approach offers the most controlled and flexible means for extracting maximum infor-

mation from the lithic record. Hypothesis generation, testing, and refinement are the primary means of any scientific endeavor and we think are the most appropriate ones for these investigations.

TRADE

Within the technological subsystem of culture, an additional aspect is applicable to these investigations: trade. Exchange systems in the recent and prehsitoric past have been shown to play a vital role in the adaptive processes of culture. Included in exchange systems, in addition to the actual goods or raw material, is communication. This contact and information exchange affects all parties involved and is a source of cultural interaction and evolution.

The ethnohistorical record of the Southeast indicates that trade, the exchange of commodities and goods, was actively practiced by aboriginal groups. Salt, herbs, marine curios and ornaments, lithic raw materials and products, feathers and skins, metal (usually copper), and pottery are commonly mentioned (Swanton 1946:736-742).

Swanton (1946:736) observes that commodities and goods are distributed in two general trends: (1) between the coast and uplands and vice-versa and (2) from the uplands to the plains and vice-versa. The coast-upland distribution is considered particularly relevant to this project. A model based on the ethnographic data of nearby groups can be constructed.

The model essentially records the flow of raw materials and finished articles between coastal and upland groups based on

accounts of the Caddo and Quapaw (Swanton 1946:736). Lithic raw material (flint), projectile points/knives, bow wood, skins, and stone beads were traded toward the coast. Processed fish (dried or smoke), marine curios, oil jugs, and salt are reported to have been traded into the uplands (Figure 11).

Lithic Raw Materials	Caddo	Marine Curios and
Projectile Points	Avoyel	Shell
Bow Wood	Opelousa	Oil jugs
Skins	Chitimacha and	Processed fish
Stone Beads	Atakapa	
Coast	Karankawa	Coast

Figure 11. Model of Historic Southeastern Trade

Other commodities and products of general upland or coast origin are reported in the ethnohistoric literature and can be added to the materials listed in the model. Additional materials can be assigned a coast or upland origin: shell, copper, and mica. Other trade items are reported, like mockingbirds, pet squirrels, and certain herbs, but their distribution range prohibits an upland or coastal assignment.

The fact that an active exchange of goods and commodities were practiced by aboriginal Southeastern inhabitants during the 16th and 17th centuries appears reasonably well documented. The social or institutional mechanisms through which trade was conducted and the reasons for its initiation are less clear.

Harris (1971:285) offers an elegant statement concerning possible reasons for the institution of trade among hunters and

gatherers. "(They) want valuables...that are produced by or controlled by peoples with whom they have no kinship ties." Trade partnerships, which establish fictive kinship ties, are considered to be the most common solution to trading without kinship ties or in the absence of state controlled markets during the protohistoric period of the Southeast and hence most likely throughout the prehistory of the region. We assume that much of the exchange was based on trading partnerships.

Winters (1968:216), discussing trade of the Late Archaic Indian Knoll peoples, presents three alternatives to account for the presence of exotic raw materials and implements. These alternative include "transhumance" or seasonal movements of groups to coastal area, trading relationships between neighboring groups, and redistribution centers which provide raw materials or products for a number of inland groups.

We consider the first and third of these mechanisms least likely. The "transhumance" alternative is considered improbable because of the structure of hunting and gathering societies, the distances involved, and the required sociopolitical relationship with groups occupying or utilizing territory between the upland "home" and coastal locale.

The redistribution center concept, the third alternative, is considered viable for chiefdom societies, but unlikely for band level organizations throughtout most of the prehistory of the Upper Tombigbee Valley. Perhaps during the Late Woodland or Mississippian periods, groups occupying the Upper Tombigbee area may have interacted with chiefdoms which maintained trading centers, but we currently have no concrete evidence of the opera-

tion of such centers.

Winters (1968) effectively dismissed alternative one and two, only because appropriate archaeological sites are absent in the coastal locales. He does not have any "basic theoretical objection" to trading relationship alternative. In effect, Winter broadens his trading relationship concept to apply to groups rather than individuals.

Trade appears to be clearly established by Late Archaic times (Goud 1980). This is generally manifested by the presence of conch shell in the north and copper in the south. Intensive intraregional exchange is indicated by the distribution of raw cherts and lithic products such as steatite and sandstone vessels, banded slate atlatl weights, and lapidary beads.

Middle Woodland trade is most often reflected by goods recovered from mortuary complexes. Items characteristic of this interaction include Flint Ridge and other cherts, obsidian, copper ornaments, cut mica, platform and pan pipes, galena, and greenstone celts. The widespread distribution of Middle Woodland ceramic vessels also is considered indicative of trade. Whether the vessels themselves or their contents were the commodity of exchange probably cannot be ascertained.

Mississippian Trade is reflected in the same general kinds of commodities and goods that entered the trading systems during the Archaic and Woodland Stages: lithic raw material and products, marine curios, shell ornaments, copper, and mica. Often the exchange of exotic goods is qualitative and quantitative, reflecting stylistic changes and the greater accumulation of non-local commodities and goods in central places. Futher, the eth-

nographic record of the prothohistori` period, the 16th and 17th centuries, provides some insight into the quantity and kind of perishable materials that were being transported through Mississippian trade networks.

In summary, the presence of exotic, non-local, raw materials is expected to appear in the archaeological records of the midden mound sites situated in the Upper Tombigbee area. These exotic materials are assumed to reflect trade between groups occupying the region. We expect to see trends reflecting essentially a north-south flow, upland-coast and reverse, of commodities and goods. The exchange of goods is assumed to be conducted through trading partnerships which operated within band level social organization. Finally, we expect to see the first evidence of exchange in the form of exotic material no later than the Late Archaic period and most probably within the eariliest deposits of the Upper Tombigbee Valley midden mounds.

SOCIAL ORGANIZATION SUBSYSTEMS

The second subsystem of culture which can be addressed in these investigations is social organization. Presented below are ethnographic and archaeological models from which structured models, hypotheses and expected supportive data can be gathered. Due to the limitations of the project presented previously, the main aspects of social organization which we can investigate are community plan and status. As with all the subsystems of culture addressed in this research, we will not limit our observations to what has been previously identified, but it certainly is a logical beginning.

COMMUNITY PLAN

Studies o:f contemporary hunters and gatherers are an important source of data for ethnographic analogy. Although many of the features of hunter and gatherer social organization are difficult to test archaeologically, some of their salient characteristics should be examined in terms of their influence on the demography of small-scale societies.

Hunting and gathering groups are often composed of coalitions of families that move their campsites a number of times per year. Functioning s a social and subsistence unit within a territory, they aggregate and disperse seasonally. These foraging groups tend to be highly mobile. The resulting social organization is stable but fluid. Group size, internal structure, and membership often change throughout the course of a year, or even from week to week, depending on seasonal, social, subsistence, environmental, or other factors. Group composition is dependent upon congeniality, age and sex relations, kinship ties, and friendships. Individual prestige and influence are validated in daily life through the wisdom and ability to contribute to the well-being of the group (Leacock 1978).

The hypothesized community plan of the midden mounds is based on evidence left by the Archaic folk who inhabited the shell middens of the western Middle Tennessee Valley. In general we expect to find habitation areas which have been used as the focus of domestic activities. A variety of burial types, storage bins, fire hearths, and flint workshops should be found in the midden mounds (Dye 1980).

<u>Habitation Areas</u>

The character of the shell middens in the Western Middle Tennessee Valley is defined by a number of shell and earth lenses. The shell lenses are irregularly placed and interspersed with soil lenses which contain a smaller percentage of shell and are spread over a considerable area. The earth lenses are often 4.5 m across and 30 cm thick. The shell midden stratification may result from the circular earth lenses being used as habitation areas or shelters. If the shell refuse was thrown outside the dwelling areas onto an adjacent rubbish pile, it would accumulate in layers and would eventually rise the level of the area surrounding the living area. When this occurred, the habitation area apparently was moved to the adjacent higher midden deposit. The shell began to be deposited over the old, lower habitation area. Thus, the solid shell layers appear interspersed with the earth lenses which contain bone, charcoal, ashes, and other midden debris.

The earth lenses contain smaller clay habitation floors which may represent the remains of shelters. Habitation floors were constructed from sterile clay that was brought on the shell midden and spread on the earth lenses in uneven layers from 5 to 15 cm thick and covering an irregular area 1.8 to 3.0 m in diameter. After the clay had been smoothed, fires were built on the surface, hardening and turning the platform a bright brick red. Some platforms are conical, the centers being nearly 30 cm higher than the edges, while others are flat and level; a few are slightly concave. Several of the platforms have four or five superimposed clay layers. Well defined vertical postmolds often

penetrate the floors or are located just outside. They are irregularly placed and not outline of a structure can be traced from them. These fired clay floors were probably the centers of domestic activities, because all around them are ashes, charcoal, and black earth filled with the bones of white-tail deer, birds, and fish, stone fragments, and chert debris.

These burned clay floors are often associated with other features. Usually there is an associated fire hearth or burned area in the center of the clay floor. These shallow basins are 0.6 to 1.5 m in diameter and are filled with ashes, broken rock, and clean shell. Postmolds are often associated with the fire hearths. Another feature associated with the clay floors is a burned, prepared clay cooking pit containing loose rock and charcoal. They are usually 35 to 40 cm in diameter and 15 to 30 cm deep. The clay walls are generally 5 cm thick. The loose rocks may have been heated in the pits and used for cooking. These pits are also found scattered throughout the midden. Burials are also often associated with the floors (Webb 1938; Webb and DeJarnette 1942).

Burials

During the history of the shell middens in the Western Middle Tennessee Valley there was considered diversity of burial types: within a specific type, however, they were quite uniform. Age, sex, or accompanying artifacts had no apparent determining influence on burial form.

Burials rarely were interred deeply. In some cases the body was placed on the shell and loose shell was scooped up to cover

it. Burials were often made near fire hearths, perhaps within the floor dwellings.

Over half of the burials are without grave goods and often the percentage is much higher. Burial offerings are most frequent with children. Several types of burial goods are generally found. The first includes the articles of dress or adornment which were attached to the clothing or the person and probably were included in the grave as a matter of course, being the property of th deceased. This would include stone, bone, or shell beads, pendants, gorgets, and bone pins. The second class of artifacts includes objects that are common throughout the midden such as flint and bone artifacts. The third includes intentionally placed artifacts such as conical tubular pipes, tool kits, and exotic artifacts.

Exotic artifacts include bell-shaped tubular stone pipes; small, triangular pendents; flat disk shell beads; long cylindrical columella beads; long, cylindrical and barrel shaped jasper beads; small gastropod beads; and copper artifacts. Dog burials were often found, sometimes buried underneath or near humans.

Dismembered bodies are found occasionally. In some cases the bones or body parts are in anatomical order, but the parts which are present are in disarray. Burials are also found with projectile points imbedded in various parts of body: shoulders, spinal column, chest cavity, and mouth. Heads and body parts are often found missing. Sometimes only portions of bodies are recovered, often only the head. Artifacts are sometimes found that have been made from human bones.

In the early stages of the middens, cremation in situ was the

dominant practice. The gathering and redepositing of cremated remains may have been a comparatively late trait. Cremations are often located in the tops of the fire hearths. Sometimes a fire was built on top of the fire hearths. Sometimes a fire was built on top of fully flexed burials and the bones became calcined. The graves are often covered with boulders or with a thin layer of shells.

Partially flexed burials are another important type. The legs of this type are bent at the hip with the thighs placed approximately at right angles to the body and the feet drawn up until the heels are near the pelvis. The pit or grave was not circular but varied from rectangular with rounded corners to elliptical or triangular.

Some burials were placed in stone lined graves. The stones are flat, thin, limestone slabs. Other were laid on several large water-worm river boulders. Large limestone slabs were also placed over the pelvis or abdominal region. Occasionally the body seems to have been laid on top of the midden and covered with large stones. Shell was then placed on top of the stones. Round burial pits filled with small fire-cracked Cobbles are sometimes found.

Fully flexed burials in round graves are the most numerous and perhaps earliest of the burial forms. A circular pit with vertical walls was dug so that it was just large enough to receive the flexed and bent body. An analysis of the relative positions of the body parts in completely flexed round grave burials leads to the conclusion that the body at death was rolled, fully flexed into a close bundle with the legs drawn up,

heels against the buttocks, knees up under the chin, arms closely flexed with the hands near the face, and vertebral column bent forward to nearly touch the knees. The disposition of the arms showed some individual variation. The body was probably tied in that position, after being covered with skins or textiles to completely encase it, converting it into an elliptical bundle. This bundle made the front, back, or sides of the body indistinguishable from each other. When ready for burial, a small, round pit was dug just large enough to receive the egg-shaped bundle. The manner of accidental placement in the grave determined the type of round grave burial. If a fire was placed on top of the bundled body, cremation or partial cremation would result. If the bundle was laid on the midden and covered with shells, a typical fully flexed burial would result. This may be the reason all of these apparently different types of burials seem to have been practiced simutaneously by the same people at all levels of the middens. Four varieties of fully flexed burials are known.

The first is the sitting burial. A small pit was dug to a dept of 75 cm and the body was placed in a sitting position by leaning the back against the vertical pit wall. The grave may have been covered with bark or wood and then shell piled over the top. The walls often gave way before the covering earth fell in. The graves apparently were not filled with earth since post-burial slumping usually produced considerable change in the original position of the skeleton permitting the head to fall forward reaching the pèlvis cavity face downward, and the legs to spread apart, leaving the feel under the shifted skeleton.

Sitting burials placed in pits were often covered by large flat stones or by river cobbles. Such stones were not usually used to cover other round grave or partially flexed burials. The desire to cover a sitting burial may have been the reason for the placement of inverted steatite and sandstone vessels in these graves, particularly those of infants and children. Some of the vessels were broken when placed in the graves. They might have been used because they were large fragments of stone, not because they were or had been utility vessels. This is supported by the fact that the vessels are usually inverted over the head of the burial, precluding the containment of food or drink for the dead. Also, burial offerings were not important at this time. The vessel fragments might have been used to protect the body, to mask the face, or to hold the body in place.

Sitting burials are frequently accompanied by many artifacts such as stone bar gorgets, bone awls, antler drifts, animal jaws, beaver incisors, and flint projectile point knives. They occur more frequently and reach a maximum in the Late Archaic period, but are not the exclusive mode. Dog burials are common with sitting burials.

The second manner of burial is fully flexed on the side, usually on the left. A small pit was dug to a depth of 30 cm and 60 cm in diameter. The third manner of placement of the body in the round grave is fully flexed on its back. This resulted in a closely packed skeleton which differed little from the fully flexed burial on its side, except that the bertebral column was comparatively flat since the bottom of the grave was flat. In the fourth type of fully flexed burial the body and the legs are

completely flexed, but the legs are spread one to each side (Webb and DeJarnette 1942, 1948a,b,c,d).

Storage Bins

There is some evidence for the use of storage bins by the shell midden occupants. Nuts, roots, and seeds may have been gathered and then stored in these features. Circular pits, 1 m in diameter and 75 cm deep, are usually filled with midden debris such as burned white-tail deer and turtle bones, charcoal, broken artifacts of bone and flint, shellfish, and a few large stones. Some cooking may have been done in them (Webb and DeJarnette 1942).

Fire Hearths

The numerous fire hearths are usually shallow, circular depressions or basins about 75 cm in diameter, although they vary from 46 cm to 1.3 m. The walls are made of puddled clay 2.5 cm thick which has been fired red. The bottoms of the hearths are sometimes floored with stones. Usually there is a layer of clean light ashes and charcoal over the clay. Often fire-cracked stones are found in the ashes as well as charcoal, burned animal bones, and shellfish. Sometimes the hearths are covered with a quantity of large and small limestone rock, all showing the effects of fire. Whenever a hearth is filled with shells, a charcoal area is usually found nearby. The hearths are filled with various layers of shell, ash, charcoal, and burned earth (Webb 1939; Webb and DeJarnette 1942).

Hot Rock Cooking as Postulated by Webb and DeJarnette

Scattered, burned, and broken river cobbles are important

artifacts found in the shell middens. All fire hearths are associated with many fire-cracked cobbles. The broken cobbles show fractures caused by fire and are scattered throughout the midden. These broken river cobbles, which constitute in some areas as much as five percent of the total midden accumulation, probably represent the waste from cooking.

Shellfish from the shoals may have been placed in a container filled with water which could not be put on the fire. River cobbles, heated in nearby fires, are dumped into the container, thus cooking the shellfish. The cobbles were eventually broken by this process and cast away as waste.

This type of association of fire and river cobbles suggests another cooking technique. A fire is built on a small area floored by river cobbles. When the cobbles are hot, the fire is swept away leaving the ashes under and between the cobbles. Shellfish are then dumped onto this bed of hot rocks. The liquid content of the mussels, in contact with the hot stones, would produce quantities steam. The steam rising through the pile of mussles would partially cook and make them ready for eating. Shellfish subjected to such a flow of steam can be cooked in 20 seconds. This process might account for the small areas located in the middens that are floored with river cobbles. Within these areas, ashes are found under and between the cobbles. Many of the cobbles are cracked by apparent sudden cooling. Also, the occasional finding of many paired mussels lying undisturbed on such a bed of river cobbles would indicate that in some cases the number of shellfish cooked was in excess of the demand for immediate consumption (Webb and DeJarnette 1942).

Flint Work Shops

Flint work shops are common throughout the shell middens. They consist of concentrated layers of cores, flakes, debitage, hammerstones, blades, and projectile points. Sometimes found in shallow depressions in the shell, they can be as much as 1.2 m in diameter. Elliptical areas 2.4 by 1.5 m are found. The flint is usually gray. Caches of flint blades in small pits 45 cm in diameter are also found.

MORTUARY PATTERNS AND STATUS

A testable model of Late Archaic mortuary patterns in the Midwest and Midsouth is proposed. The model is based on burial data from the Green River region of Kentucky, the Lower Tennessee River region of Western Tennessee and the Eastern Middle Tennessee Valley in Northern Alabama and is proposed for the Late Archaic mortuary patterns in the Upper Tombigbee Valley.

The purpose of the model is to examine several aspects of the mortuary activities and patterns in the Centrl Riverine Archaic (Dragoo 1976). The primary focus is the distribution of grave furniture in terms of age and sex variables. A model of mortuary patterning will be built using data from the Green River region of Kentucky (Winters 1968), the Lower Tennessee River region in western Tennessee (Magennis 1977(, and the western Middle Tennessee Valley in northern Alabama (Dye 1978). These studies are based on the analyses of several Late Archaic skeletal populations nd burial associations excavated by the 1930s federal work relief projects.

Green River Region

Eight Late Archaic shell middens from the Green River region

were studies by Winteres (1968). These Indian Knoll phase (2500-2000 B.C.) sites were excavated in the 1930s by WPA labor and include a variety of sites. Winters (1968:176) subsumes these under three settlement systems units. The Ward unit includes Butterfield (settlement), Ward (base camp), Barrett (specialized collecting camp), and Kirkland (hunting camp); the Read unit is known from Read (settlement) and Carlston Annis (base camp); and the Chiggerville unit encompasses Chiggerville (settlement) and Indian Knoll (base camp). Butterfield appears to have been left out due to an editorial oversight by Winters. The number of burials from each site and the percentage of burials with grave goods are: Butterfield - 153 (11%); Ward - 433 (13%); Barrett - 412 (25%); Kirkland - 70 (6%); Read - 24 (31%); Carlston Annis - 390 (47%); Chiggerville - 114 (31%); and Indian Knoll - 880 (31%) (Winters 1968, 1969; Webb and Haag 1940).

Using burial and summary artifact tables, Winters examined the association of specific artifacts with the sex and age of the individuals of the various skeletal populations. Burials with definite sex identifications were used. He devised three artifact classes: (1) utilitarian, (2) cermonial, and (3) ornamental items (Winters 1968:177-182). Utilitarian items included general utility implements, weapons, fabricating and processing tools, domestic implements, and woodworking tools. Ceremonial goods are always manufactured from local raw materials, with the exception of the marine shell cups. Ornamental items include three major types of raw material: bone, stone, and imported resources (conch shell and copper).

Although it is not entirely clear how Winters arrives at many of his statistical conclusions, he does note several trends in the various artifact classes. Utilitarian items found solely in association with males include woodworking (axes, ground hog incisors), fishing (fishhooks), manufacturing (cannon bone awls), and flint knapping tools (flakers, antler drifts). Class 1 grave goods found predominantly in male association, but also with females, include weapons or weapon components (projectile points, atlatl weights, hooks, and handles), general utility artifacts (knives and scrapers), certain fabricating and processing tools (drills and various types of bone awls), and items of uncertain function (bone pins). The fabricating and processing tools when found with males are generally more varied and are found in greater concentrations. Items definitely linked with females include certain domestic equipment (nutting stones) and certain fabricating and processing tools (gravers). Tools found predominantly in female association, but also with males include certain domestic equipment (pestles).

With respect to Class 2 items (ceremonial equipment), females tend to share rather high percentages of them compared to males. These include flutes and turtle shell rattles, which are items thought to be part of certain medicine bundles. Males tend to be exclusively associated with other types of medicine bundles which include postcranial bones and mandibles of various animals; raccoon, weasel, wolf, deer, fish, squirrel, ground hog, snake, drumfish, and shell cups (adult males). Winters (1968:207) notes that:

> It seems obivious that females were receving equal, or

> even greater attention than males with respect to certain aspects of burial customes, and that form some reason they were often associated with just as much ceremonial equpment as males, with the quipment being identical for each sex.

He concludes (1968:208) that "some females occupied special statuses of one sort of another, as did some males, and that there was a considerable sharing of the artifacts symbolic of these statuses."

In terms of ornamental artifacts (Class 3), males tend to be associated with more marine shell than females and to have larger shell items such as gorgets. BUrial goods found predominantly in male association include bone hair pins, conch columella and tusk-shaped pendants. Bone beads, conch earplugs, and shell discs are definitely linked with females. Triangular and strip shell pendants are found with both males and females. Copper artifacts are found in greater quantities with males than with females. Utilitarian copper artifacts are generally found with females, while ornamental copper grave goods are often associated with males. In terms of age categories, Class 3 artifacts tend to be equally distributed. Disc shell beads, however, are most frequently found with adolescents and pre-adolescents. Winters (1968:208) makes three pertinent concluding statements concerning the distribution patters of ornamental artifacts: (1) males are often associated with the large marine shell artifacts, (2) there appears to be a continuous flow of ornaments to both females and children, and (3) only a very small proportion of the burials was tangibly associated with these special artifacts. With the

exception of the Class 3 artifacts, the population was socially homogeneous and without great differentials in the basic way of life.

Lower Tennessee Valley Region

Magennis (1977) has recently described and analyzed the social organization and structure of Middle and Late Archaic populations in western Tennessee from the Cherry and Eva sites. These sites were excavated with WPA labor in the 1930s. The Cherry site is probably an upland base camp, while the Eva site is most likely a floodplain base camp. The number of burials from each site and the percentage of burials with grave goods are; Cherry 1 - 60 (40%), Eva I and II - 118 (29%), and Eva III - 59 (37%). The Middle Archaic populations were taken from the Eva I (Eva phase, 6,000 to 5,000 B.C.) and Eva II (Three Mile phase, 5,000 to 3,000 B.C.) components. The Late Archaic burials are known from the Eva III (Ledbetter phase, 2,500 to 1,000/500 B.C.) component of the Eva site and from the material from the Cherry site.

Burial associations were coded into four general classes: food acquisition, domestic, ornamental/entertainment, and exotic. Hunting, fishing, and plant food acquisition tools include projectile points, blades, hoes, atlatl hooks and weights, shaft straighteners, flakers or drifts, knives, preform blanks, fish hooks, and hammerstones. Domestic items (woodworking, hideworking, and weaving) include drills, adzes, worked and unworked animal bone, indigenous unworked shell (spoons), bone awls, bone needles, bodkins (spatulate weaving?), scrapers, and

unworked turtle shell plastrons. Ornamental/entertainment items include ground stone beads, worked bone beads, indigenous shell beads, bone hair pins, bone whistles, turtle shell bracelents, ochre, unworked bone vertebrae (necklace), turtle shell rattles, ground stone tubular pipes, crinoid beads, and bone pendants. Worked marine shell (dippers and gorgets) and copper beads comprise the exotic trade goods.

In the Middle Archaic components at Eva (Eva I and Eva II) 29% of the population was afforded grave goods; of these 60% were utilitarian (food acquisition and domestic) and 40% were ceremonial/ornamental goods. No exotic items were found. Grave goods were distributed randomly throughout the entire age range, although subadults received proportionately fewer utilitarian items, but had more ornamental/entertainment grave goods. Males and females were given equal proportions of food acquisition tools, while females were afforded more domestic and ornamental/entertainment artifacts at the time of death.

The Late Archaic components at Eva (Eva III) and Cherry differed in several ways from the earlier Middle Archaic components at the Eva site. Of the 37% of recovered burials having goods from Eva III component, 72% were given utilitarian goods, while 28% were afforded ornamental/entertainment items. At the Cherry site approximately 40% were utilitarian and 52% were ornamental/entertainment. Both sites indicate a slight increase in the proportions of interments afforded grave goods from the earlier Middle Archaic component. Although some exotic items were found, none were located in the earlier components. A random distribution of artifact classes by age was noted. The only

exception was the Eva III subadults, who did not have any grave goods. The distribution of burial goods in terms of sex was also found to have a random assortment. Males did receive a greater proportion of the types of goods than females, particularly domestic grave goods. Males and females received equal proportions of ornamental/entertainment items; however, they were found only in the presence of utilitarian goods. Exotic items were found only with males and most of the time with subadult males.

Magennis (1977:iii) suggests that there was little elaboration in the mortuary ritual and that all members of the population were afforded similar treatment at death. She found little or no evidence for differential treatment that could be indicative of status positions. Less than half of the Middle and Late Archaic individuals had grave furniture and most of the grave goods were utilitarian.

<u>Western Middle Tennessee Valley Region</u>

Dye (1978) has analyzed the mortuary patterning of Middle Archaic burials (Sanderson Cove - 6000 to 4000 B.C. and Late (Perry phase - 4000 to 1200 B.C.) from the Perry site (1LU25) in the western Middle Tennessee Valley. The burials (327) were excavated in the 1930s with federal work relief labor. The Perry site probably served as a floodplain base camp within the Lauderdale culture settlement pattern (Webb and DeJarnette 1942, 1948c).

In order to collapse the burial data into manageable units, six artifact classes were examined. These are partially based on Magennis (1977:173); (1) no goods, (2) food acquisition

artifacts, (3) domestic items, (4) ornamental/entertainment goods, (5) exotic items, (6) combinations of 2-5. Nine age categories were based on the data found on the burial tabulation sheets at Mound State Monument: fetus, newborn, infant, child, adolescent, subadult, young adult, midadult, and old adult.

The statistical tests indicate a lack of status positions or burials with exotic grave goods. Less than half (42%) of the population was interred with grave goods. A greater proportion of the grave goods did appear to be utilitarian than non-utilitarian. The burial goods did exhibit a random distribution in terms of sex and age variables. Adults as a group appeard to have more utilitarian grave goods than those of younger adults. Males and females in the Perry site sample statistically had equal proportions of food acquisition tools.

Expected Trends in Grave Good Distribution

Predictions of the distribution of grave goods that might be found in the midden mound excavations, based on the foregoing descriptions of mortuary practices, are summarized below in outline form.

General Trends

1. Less than 50% of the population will have grave goods.
2. Most of the grave goods will be utilitarian.

Specific Trends

1. Utilitarian items
    A) Males will have a greter proportion of grave goods than females, particularly domestic items.

B) Males are often found exclusively with woodworking, fishing manufacturing (cannon bone awls), and flint knapping tools.

C) Females are definitely linked with certain domestic equipment (nutting stones) and certain fabricating and processing tools (gravers).

D) Males are predominantly found with weapons and weapon parts, fabricating and processing tools (drills), and items of unknown function (bone pins).

E) Females are found predominantly with certain domestic equipment (pestles, copper needles and awls).

2. Ceremonial items

A) Males are found predominantly with exotic items.

B) Males often are exclusively found with certain types of medicine bundles (postcranial bones and mandibles of various animals, and marine shell cups).

C) Females tend to share high percentages of certain medicine bundles (flutes and turtle shell rattles).

IDEOLOGICAL SUBSYSTEM

The prime ideological component of man's adaptation to his environment is religion, which may be defined as belief systems which "ensure the acceptance of social conventions by means of sanctification" (Drennan 1976).

Rappaport (1971) has subsumed religious activity under three

major headings (1) ultimate sacred proposition, (2) ritual, and (3) religious experience. The first is the set of unverifiable beliefs whihc are held as unquestionable by the faithful. These are interpreted at lower levels of experience through acts commonly known as rituals or ceremonies. In turn, the purpose of this is to enforce religious experience and thus support the ultimate sacred propositions. These are summarized in a flow diagram (Figure 12) taken from Drennan (1976).

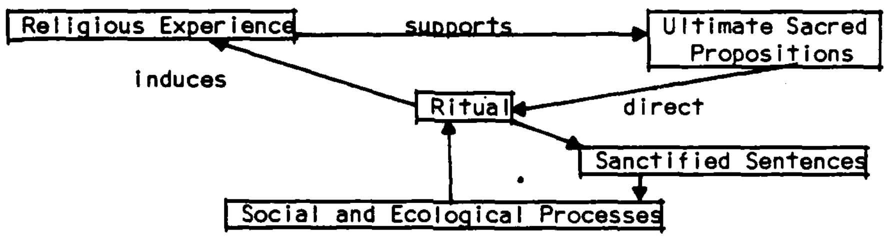


Figure 12.

Among the ultimate sacred propositions in hunter and gatherer society is the belief in spiritual or mythological beings, a concept referred to by Tylor (1871) as animism. Mystical concepts such as the belief in gods and witches form the basis for many of the ultimate sacred propositions. The constellation of unknown forces and their effect upon man's interpretation of his physical environment is known generally as his world view.

Hudson (19176) states that the Southeastern Indians conceived of their world as tripartite: 1) This World, 2) the Upper World, and 3) the Under World. This World was a great flat plane resting precariously on water, suspended from the vault of the sky by 4 cords at each end of the cardinal directions. Above the sky vault was the Upper World and below the earth and waters was the Under World. The Upper World represented order and the sta-

tus quo. The Under World represented disorder and change. This World stood somewhere between perfect order and complete chaos. The Sun was the principal God of the Upper World and was the source of all warmth and life. The Moon was the Sun's brother. The Sun and Moon were thought to pass beneath the sky vault, which was considered an inverted piece of solid rock which rose and fell twice each day at dawn and dusk.

This World was populated by three great categories of non-spiritual beings: (1) men, (2) animals, and (3) plants. Three major categories of animals were recognized; (1) the four footed animals, (2) the birds, (3) and the vermin. Among these groups the eagle, falcon, and rattlesnake had important symbolic meaning (Hudson 1976). Among spiritual beings, the Uktena or serpent was thought to exist in the Under World.

The Indians had many beliefs regarding the animals and many taboos were observed. Swanton (1928:517-518) observed that "they believe that nature is possessed of such a property as to transfuse into men and animals the qualities, either of the food they use, or of those objects that are presented to their senses; he who feeds on venison is swifter and more sagacious than man living on flesh of slower animals."

Animals which were generally avoided in the Creek diet were all birds of prey and animals of the night. Specifically eagles, ravens, crows, buzzards, swallows, bats, owls, flies, mosquitos, gnats, wolves, panthers, foxes, mice, and rats. (Swanton 1928:518).

Animals often provided names for clans and it was taboo for a person to each the flesh of the animal for which his clan was

named (Hudson 1976). In addition each clan had certain symbolic associations which were taken from the animal representation. (Hudson 1976:191,193).

In the archaeological record we might expect to recover objects which had symbolic meaning with regard to the cultural world view and mythological and spiritual deities as well as clan totem fetishes. These are components of ideology, the more abstract of the major subsystems of culture, and are the most difficult to approach archaeologically.

We may expect to find information on two subsystems of ideology. The first is symbology. Certain artifacts such as effigy beads and other elements of the Poverty Point lapidary industry as described by Webb (1968) have been found in this area. Clay figurines, carved birds, and other representational objects are also reported from the Poverty Point site (Ford and Webb 1956) but as yet are not reported from the Upper Tombigbee. Given the presence of raptorial bird representations at Poverty Point and the importance of similar designs on Hopewell and Marksville pottery it would not be at all surprising to find this or other representational elements on certain Alexander ceramics which would be temporally intermediate.

Little information is expected on symbology for the Woodland and Mississippian stage in this project. Some representational objects are known for Woodland, such as pipes and figurines, but are not expected in the context of the midden mound sites. Mississippian ceramic, shell, and other industries produce a wealth of data on Mississippian symbology, but again such data is not expected from this project.

With the growing importance of faunal and botanical analysis in archaeology and the increasing body of data, some attention is beginning to be given to another subsystem of ideology, food taboos, particularly as they relate to animals. This project will be conscious of the potential for such research, but given the general poor preservation of bone at the sites, little data is expected.

ARCHAEOLOGICAL RESEARCH

HISTORY OF ARCHAEOLOGICAL RESEARCH IN THE UPPER TOMBIGBEE VALLEY

Knowledge of previous archaeological work in any research area is necessary before additional projects are conducted. The constantly changing archaeological data base and theoretical biases make it mandatory to be familiar with relevant research.

This history of archaeological work in the Upper Tombigbee Valley is a summary of the research that has been undertaken before 1972 and that done after federal funds were authorized in 1972. Implicit within these two sections is a major theoretical stance between archaeologists who eschew a "normative" framework and those who emphasize "culture process" (Flannery 1972).

The purpose of this discussion is not to point cut major changes in field methods and laboratory techniques with regard to these theoretical concerns, but rather to update and synthesize a body of archaeological literature which is relevant to our current research interest.

ARCHAEOLOGICAL RESEARCH BEFORE 1972

Jesse D. Jennings (1941, 1944) conducted research in

northeastern Mississippi from 1940 to 1941. The historic Chickasaw, who occupied this area of Mississippi during the contact period, were his primary interest. Four sites at the Chickasaw Old Fields near Tupelo were investigated. He explored a large Middle Woodland (Miller) village area and associated mound group (MLE 62), and several large Chickasaw villages (MLE 14, 18, 19, and 100). The results of these excabations provided substantial information on Chickasaw and Woodland (Miller) components.

The Miller sequence (Jennings 1944), established from work along the Natchez Trace, was the first attempt to define discrete cultural stratigraphic units in the Tombigbee Valley. Three prehistoric ceramic groups were defined on the basis of temper and surface decoration. Miller I was characterized by fabric-impressed, sand-tempered, cord-marked and plain pottery, and Miller III ceramics were predominately claygrit-tempered or grog-tempered.

In 1951, Cotter and Corbett (1951) excavated five mounds and an associated village area (Bynum Mounds) along the proposed route of the Natchez Trace Parkway in northeastern Mississippi. A Miller I mound group, containing burials and grave goods, was described, and chronological information based on earlier ceramic associations was gathered. Jenning's divisions of the Miller sequence into Early, Middle, and Late periods were supported by this work.

No major investigations were undertaken after this work in Mississippi until 1966 when Charles Bohannon (1972) excavated the Pharr mound group, consisting of eight dome-shaped, Middle

woodland burial mounds. Details of mound construction and locations of features within the individual mounds were recorded. Bohannon attempted to refine the Miller ceramic sequence by drawing upon Jenning's pre-World War II surface collections, and seriating the relationships within the sand-tempered Miller series. He identified Bynum as Miller I and the mounds that Jennings excavated as Miller II. In 1969 Hanson (1969) conducted a survey of Town Creek Watershed (Lee County, Mississippi).

ARCHAEOLOGICAL RESEARCH AFTER 1972

With the beginning of monetary appropriations for increased archaeological work along the Tennessee-Tombigbee Waterway in 1972, a number of surveys and test excavations were carried out (Lewis and Caldwell 1972; Rucker 1974; Blakeman 1975, 1976). Other monetary sources soon became available in the form of state grants. Marshall and Glover (1974) conducted an archaeological survey of Tishomingo State Park, in the Bear Creek Watershed, and found evidence of Early Archaic, Middle-Late Archaic, Gulf Formational, Middle Woodland, and Late Woodland cultures.

Rucker (1974) conducted survey and test excavations along the Tombigbee in the vicinity of Columbus, Mississippi. The results of test excavations at the Vaughn mound, a Middle-Late Archaic "midden mound", containing numerous human burials, were included in the report (Atkinson 1974). In addition to burials, subsistence remains (animal bone, shellfish, and carbonized plants) were recovered from an Archaic context.

Additional surveys and test excavations were conducted by Blakeman (1975) in the upper Central Tombigbee Valley. During

this time he tested several large "midden mounds" which contained Archaic deposits as well as Late Gulf Formational, Woodland, and Mississippian occupations. Excavations at the Kellogg mound and Barnes mound showed that stratified Archaic sites were present in the drainage with good evidence of subsistence items in Archaic contexts.

Blakeman (1976) conducted an archaeological survey of the Aberdeen Lock and Dam and Canal Sections of the Waterway. Numerous sites were recorded which dated to Archaic, Gulf Formational, Woodland and Mississippian times. This survey recorded sites from Aberdeen Lock and Dam to Bay Springs Lock and Dam.

Thorne (1976) conducted a survey of the Divide-Cut section of the Waterway. He located numerous Archaic sites. Representative components from all curently recognized cultural stages were found in the survey; however, the majority of the sites were Late Archaic and Middle Woodland.

Atkinson and Elliott (1978) conducted a cultural resource survey of selected areas in the Tennessee-Tombigbee Waterway in Alabama and Mississippi. Hubbert (1977) surveyed the Bay Springs impoundment area during the summer of 1976. He located numerous Late Archaic sites. Components recognized in his survey included all major cultural stages.

In 1976, Atkinson conducted a survey of selected construction areas along the Waterway from Pickensville, Alabama to the upper end of the Canal Section near Belmont, Mississippi (Atkinson 1977). Sites located during this survey include representive components of all stages recognized in that area.

In 1977, Penman conducted archaeological site surveys in northeastern Mississippi (Penman 1977). He surveyed the Town Creek and Mantachie Watersheds, recording numerous Archaic, Woodland (Miller II and III), and historic Chickasaw sites. The majority of the sites found in the Town Creek Watershed were Miller II and Miller III, while sites in the Mantachie Watershed were primarily Late Archaic and Miller II and III.

After a preliminary survey, an intensive testing program was undertaken by Bense (1979 a,b,c) to evaluate the research potential of certain sites in the central and upper portions of the waterway from Aliceville, Alabama to the headwaters of the Tombigbee at the Divide-Cut. One intensively tested site, 22IT581 (Bense, Walker, and Partlow 1979), revealed large Middle Woodland and Early Archaic componets. Other sites revealed deep Archaic occupations at "midden mound" localities. Smaller sites representing all cultural periods were noted.

Additional excavations have taken place: Arkinson (personal communication), Brookes (1979), Lafferty and Solis (1979), O'Hear (personal communication), O'Hear and Conn (1977), and Otinger and Hoffman.

O'Hear and Conn (1977) found a Middle Woodland component at the L.A. Strickland I site (22TS765). Lafferty and Solis found Archaic deposits while testing a series of rockshelters in the Bay Springs impoundment area. Otinger and Hoffman (n.d.) excavated at Brinkley Midden (22TS729) south of Corinth, Mississippi. Atkinson (1978) and Rafferty, Baker, and Elliott (1980) conducted excavations at the Kellogg (22CL527) and East Aberdeen (22MO819) sites, respectively. Each contained deep Archaic deposits.

Brookes (1979), working at the Hester site (22MO569) near Amory, Mississippi, detailed a stratified Early Archaic assemblage. O'Hear (n.d.) excavated several small sites in the vicinity of the Brinkley Midden which produced primarily Archaic lithic scatters.

Research into the geomorphological and paleoenvironmental aspects of the Upper Tombigbee drainage has recently been carried out by Muto and Gunn (1980). Various topics which relate to man-land relationships such as geomorphology, archaeology, and paleontology were discussed. Although specific assemblages are not available, these data provide insight into an important area of interdisciplinary research which will benefit archaeological interpretention.

ARCHAEOLOGICAL EXPECTATIONS

INTRODUCTION

The focus of our investigations is the lifeways of the prehistoric folk who occupied six sites in the Upper Tombigbee Valley. The primary linking factors between these sites are that five are "midden mounds" and all are in or adjacent to the UTV active floodplain. The one non-midden mound is a small, single component campsite.

UPPER POTEAU VALLEY MIDDEN MOUNDS

"Midden Mounds" have been recognized in two areas: the Upper Poteau Valley of the Arkansas River Drainage in eastern Oklahoma (Galm 1978 a,b,c) and the Upper Tombigbee River Drainage in northeastern Mississippi. The definition of this site type to be used in this investigation follows that of Galm (1978a:33):

> ...midden mounds refer to the deep accumulation of cultural debris that form low, mounded deposits.... The dark color of the deposits in these sites make them easily distinguishable from the surrounding natural soils.

The primary limiting feature of a midden mound is the mounded nature of the deposits. These mounded middens are common throughout the world, but Galm is one of the few researchers to explicitly define the nature of this site type. Research questions in addition to those stated in previous sections need to be generated which are specific to the midden mound site type. They include site morphogenesis, soil dynamics, predisposition for disturbance, and site function. Determining the origin of the soil, the original land surface topomorphology, the reasons for dark soil, the morphogenesis of the midden mounds, and the location parttern in the flood plain will be a necessary part of the objectives of this research. These and other research questions will be developed into testable hypotheses.

Midden mounds have been explicitly defined and addressed in only one area: the upper Poteau River and Fouche Maline Creek, which joins that Arkansas River in southeastern Oklahoma. Galm (1978 a,b,c) co-ordinated his research by surveying, testing and excavating three midden mounds. This is the dominant type of site in the upper Poteau River Drainage.

Galm's work in the Upper Poteau Valley has produced the only applicable modes for this project because of the similarity to the Upper Tombigbee Valley in site type and related research questions. The result of his work will be used as a model for

our research. The Tenn-Tom work will be used to refine the expected archaeological record for this project.

The research in Upper Poteau Valley (UPV) (Galm 1978 a,b,c) provides information on several aspects of midden mounds. Each aspect that is pertinent to our research will be presented below.

Location

The midden mound sites are located on the active floodplain or the forward edge of the Holocene terrace. The areas selected for occupation are in the proximity of active (or once active) water sources which are often seasonally flooded. A wetland environment is presumed to have been present during aboriginal times.

Stratigraphy

The depth of the midden mounds ranges from less than 50 cm to over 3 m. Human activity has modified the soil in the site area so that it is dark brown to black and loamy in texture: thus it is easy to detect from the surrounding, poorly drained and oxidized clayey, alluvial soils.

Broad stratigraphic units are recognizable within the middens with transitions that range from clear to wavy. Microstratigraphic divisions are not visible. Mapping broad stra-

tigraphic units is possible in the exposed stratigraphic profiles, however, they are difficult to trace horizontally. Sequences between areas of the sites are often not directly correlated.

No distinctive structures were observed in the major stratigraphic units in the midden mounds. This possibly results from bioturbation, pedoturbation, and human activity. The middens are attractive locales for burrowing animals and vegetation because they are drier and less compact than the surrounding soil. The soil is also chemically different and adds to the attractiveness of the sites for flora and fauna. Pedoturbation is not well defined at the midden mounds, but the significance of this process in contributing to mixing is apparent. Less apparent stratigraphic mixing may be a result of the human occupants of the site and their attempts to modify or improve the occupational surfaces. This may have involved the translocation of midden sediments on the site. The degree of disturbance and mixing in the midden mounds, which occasionally was great enough to blur microstrata, did not obscure general trends in cultural or stratigraphic units.

Morphogenesis

The UPV midden mounds are usually oval in shape. The dark brown, rich woils are indicative of floral and faunal processing at the sites. Galm suggests that the repetition of extractive activities has resulted in the accretion of organic residue which is a significant factor in mound morphogenesis. However, the principal component of the mound deposits is a mineral soil whose

primary source is over bank deposition. The reasons for the mounded shape of the sites may be due to cultural activity: the accumulation of organic residue, the loading of alluvial silts, and the introduction of large quantities of uniform cobble size rock. The deep central areas appear to be related to a longer occupation of this portion of the site than the edges. This area has the most intensive cultural activity. These hypotheses are based on the integrity of the deposits and included features in the central area, and the lack of culturally sterile units or relatively more weathered (leached) zones.

Therefore, in Galm's investigation of the UPV midden mounds, the primary source of site soil is overbank deposition. The shaping of the site into a mound was due to buildup of organic residue, loading of off-site silts to improve the active living surfaces, and the introduction of rock.

Chronology

The length of occupations of the UPV midden mounds varies. The earliest documented assemblage is the Middle Archaic (2550-1400 B.C.). The Late Archaic Period (1500 BC - 1 AD) appears to be the time of most intense occupation of the midden mounds. Only one site has a Middle Archaic component. The Mississippian occupation is light on two sites. The Late Archaic and Early Woodland periods appear to be when the midden mounds were most utilized. Galm suggests that the repetitive occupational sequences present in the different sites represent a cultural continuum and correlate with many of the midden mound locales.

<u>Site Use</u>

The economic activities pursued from the midden mounds in the UPV include gathering (hickory nuts, seeds, mussels), hunting (deer, turkey), trapping (turtles, small mammals), and fishing. The preponderance of charred hickory nut shells in the deposits suggests that gathering is the primary economic resource. The suite of organic remains and inferred economic activities is consisten throughout the occupation of the site. This might be a result of differential preservation. The wet-dry cycles, exposure of occumpations, and recurrent use of fire are contributing factors to the poor preservation of pollen and faunal remains. Galm suggests that the sites were summer-fall base-camps.

The few cultural features were generally well-preserved. Galm hypothesizes that this is a result of maintaining living surfaces by carrying alluvial sediments onto the site. The central areas of the sites clearly contain the largest numbers of features; the types are consistent throughout the site occupations. The features are usually ash concentrations, pit/postholes, organic deposits, daub concentrations, rock concentrations, burned clay concentrations, rock/ash/charcoal concentrations, and burials.

The artifact assemblages in the deposits of the UPV midden mounds remain similar through time. The relationship between the midden mound sites is most evident in functional activities and human occupation. The artifact assemblages are additive through time and morphological variations do not seem to be related to changes in site activities. Stylistic and artifact similarities reflect a uniformity in occupations and associated daily

routines, centering on processing of fish, gathered plants and hunted animals. This extends through the gretest portion of the cultural deposits; Galm extrapolates this to other midden mounds in the valley.

The midden mound artifact assemblages are dominated by bifacial implements and fragments, and broken, complete, and reworked projectile points. Galm thought that the emphasis on these tools was from activities associated with resource processing or extraction. Support for this is found in the soils chemistry analysis, which records consistently high calcium and phosphorous values, considered indicative of plant and animal processing. Ground stone artifacts are utilized throughout the midden mound occupations and support Galm's contention. The underlying continuity of assemblages implies similarities in function and strong relationships between midden mound sites.

The lithic technologies represented at the midden mound sites are dominated by chipped stone technologies which are oriented toward maintaining existing implements rather than producing new tools.

Projectile points are produced from bifacial and flake-blank technologies. A bipolor technology is also present. Small point forms are made from a flake-core technology.

Ground and pecked stone tools occur frequently. Celts, doublebitted axes, pendants, gorgets, boatstones, slate tablets, and grooved axes were presumably manufactured by initially chipping the specimen into rough form and then grinding it to achieve the final product.

Other technologies include ceramic, basketry, shell, and

bone. Ceramic technologies were restricted to the production of utilitarian vessels. Basketry is recorded as negative impressions on basal sherds of these ceramics. The variety of shell and bone artifacts indicate that these were well-developed technologies.

The midden mound technologies appear to be additive through time. The new artifact types may reveal varying frequencies through time, but usually persist throughout the occupational sequence. This technological continuity is another line of evidence for underlying structure and extensive interrelationships between the midden mounds.

In the Wister Valley, the re-occupation of the midden mound sites for long periods of time is now well-documented. Galm thinks that whatever the factors of initial site selection were, it is safe to conclude that they were the same ones that attracted later folk. These sites appear to have been base camps, but the possibility does exist that different settlement classes may be represented within the multi-component sites.

The intra-site dynamics of occupations of the midden mounds are poorly understood. The model presented by Galm is put forth to structure future investigations. He proposes that the midden deposits can be divided into 3 zones: (1) peripheral; (2) transitional and (3) central occupational. These vary in size at different sites. The following occupational model is presented:

Central Activity Area-contains the deepest cultural deposits.

Transitional Zones-Distinct thinning of cultural deposits; cemetery areas restricted to this area.

Peripheral Zone-margins; thin cultural deposits that lens or grade into natural solum; highest density of rock; possible dumping area (?)

The soils analysis from two midden mounds revealed apparent intra-site differences in texture and chemistry. Cultural activities may have varied significantly in different areas of the sites based on changes in phosphorous (P) and calcium (Ca) values, which appear to be the best indication of associated differences in cultural activities. Trash dumping areas may be reflected in high P values. Analysis of feature soils produced mixed results. Two samples from one site revealed several differences, specifically in the P, K, and Ca values and textural classification. These are from a possible fire related feature. This is suspected by an eleveated K content and is consistent with burning vegetal and perhaps faunal materials.

Few structural remains were recognized in the midden area. Occasional posts, postholes, and daub were the only evidence for structures.

In sum, the midden mounds in the UPV are interpreted by Galm as specialized economic resource extraction and processing base camps. Consistent use of the sites through time is suggested from several lines of evidence: organic remains, features, assemblages, technologies, and community plan. These similarities also indicate interactions between the midden mounds through time.

Summary

The midden mound investigations by Galm in the Upper Poteau Valley provide useful models from which we can structure our research in the Upper Tombigbee Valley. They include:

1. The midden mounds' locations are on the active floodplain and fon the forward edge of the Holocene Terrace.
2. The stratigraphy and soils point to intense cultural activity, possibly burning and vegetable and faunal processing.
3. The source of the mound matrix is overbank sedimentation and probable loading by humans.
4. Late Archaic and Early Woodland periods appear to be the times of most intense site use.
5. The sites were specialized economic extraction and processing base camps.
6. The cultural assemblages and technologies are additive through time.
7. The chipped stone industry dominates the technologies at the site. However, it is oriented toward the maintenance of existing tools rather than tool production.
8. The intra-site dynamics are represented by a model of three concentric use areas; peripheral, transitional, and central.

TENNESSEE-TOMBIGBEE MIDDEN MOUNDS

Midden mounds have been documented in the Tennessee-Tombigbee Valley since the initial surveys in the mid-1970's (Atkinson

1974; Blakeman 1975). Subsequent work in the Waterway has revealed the presence of at least 29 midden mounds in the Upper Tombigbee Valley and Yellow Creek Valley (YCV). The information from these investigations is primarily in draft. Several reports are being written now and can not be included in this document. However, the available information will be summarized in order to form a model of the expected archaeological record in the five midden mounds to be investigated in this project. At least nine individuals have participated in these investigations of the UTV and YCV middens; the work has ranged from survey to excavation. Integration has not been attempted because our research is contemporary. The summary presented below should be considered preliminary because all the information is not available. The presentation is organized in the same format as that for the Wister Valley mounds: locations, stratigraphy, morphogenesis, choronolgy and site use.

Location

The midden mounds in the UTV are found in the Tombigbee Valley from Columbus, Mississippi upstream to the headwaters, including Mackeys Creek Valley. They also are present in Yellow Creek Valley (YCV) which is a tributary Tennessee River.

Midden mounds occur in two physiographic positions: the active floodplain and the forward edge of the Holocene Terrace. There is a pattern of occurence in these physiographic positions. Below the confluence of Bull Mountain Creek and the Tombigbee River (Smithville, Mississippi; Lock B) midden mounds are located only on the Holocene Terrace. Above this confluence, they occur

only in the active floodplain. At this time the causes of this pattern are not known. However, recent investigations (Nials, personal communication) indicate that the confluence of the Tombigbee and BUll Mountain Creek is a significant point in the river valley. Above this confluence, the character of the drainage in the Valley is a dendritic pattern of large creeks. Below this confluence the Tombigbee takes on the character of a true river in a meandering regime. The correlation of physiographic position and the nature of the river valley in relation to the midden mounds will be addressed in this project.

The local environment of the midden mounds is the same from one site to another. Perenial streams are usually adjacent to the site. In the active floodplain the site usually lies on the inside of a bend. Wetlands, marshes, oxbows, and sloughs are adjacent to the sites, which are often on the highest point in the vicinity. During the modern 5-7 month wet season, the midden mounds are islands.

Stratigraphy

The soils of the midden deposits are characteristically dark brown and organically rich loams which are easily discerned from the surrounding light brown, alluvial deposits. Within the dark brown soil, several strata can be identified, based on color, texture, structure, and cultural inclusions such as fired clay and charcoal. Micro-strata are often observed but are primarily cutural in origin (fired clay areas or charcoal concentrations). The major stratigraphic units represent different depositional episodes.

The thick organically rich midden deposits can be considered as a large A soil horizon. Within this horizon soil is evolving into A2 and developing B horizons.

The stratigraphic units within the midden mounds can be profiled but tracking them in the horizontal plane is difficult due to the subtlety of the color, texture, and cultural differences. The micro-strata within the light brown deposits underlying the dark brown midden can be easily detected by characteristics such as concretion inclusions, texture, color, and structure. This light brown soil has recently been examined by a soil morphologist (Pettry) and a fluvial geo-morphologist (Nials). These specialists stated that this soil was developed in the UTV during a stable period, ca. 7500-9000 B.C. This soil, which has a lighter hue and a well developed B Horizon with angular blocky structure, is dramatically different from the overlying midden deposits. Occasionally the former A. horizon has been eroded away. This soil contains the earliest cultural material in the sites.

In all midden mounds the dark organic soil has undergone extensive bioturbation. The vegetation on the sites, consisting of hardwoods, shrubs, and vines, is more dense than that of the surrounding area due to the unusually rich soil. The loamy midden is less compact than the surrounding terrain and encourages a high population of earthworms, crawfish and small burrowing mammals. These factors have caused considerable cultural mixing which often blurs the microstratigraphy.

Morphogenesis

The Tombigbee Valley and Yellow Creek midden mounds are

usually oval, varying from 30 to 200 m in diameter. They range from 0.5 to 3 m in height. The primary source of the soil appears to be overbank deposits. The middens are natural in origin and probably represent point bar deposits with some cultural modification. The dark color of the soil may be due to charcoal and organic residue that remains from human use of the site.

Chronology

The midden mound occupation extends throughout the aboriginal settlement (Paleo-Indian to Mississippian). The Late Paleo-Indian occupation is not well defined, but it is present on at least four sites (22IS565, 22IT576, and 22MO710, 22IT539). When encountered in excavations, the Late Paleo-Indian and Transitional Dalton material is usually in the light brown strata, which underlies the dark brown midden.

Late Middle Archaic to Late Archaic components represent the majority of Archaic occupation in the Upper Tombigbee Valley. Specifically, heavy utilization of the area appears to have occured during Benton times from 4,000 - 3,000 B.C.

Gulf Formational and Woodland deposits (2,000 B.C. - A.D. 1) are consistently located in the upper 20% of the middens. Use of the midden mound sites seems to have decreased after 3,000 B.C. Alluvial deposition also decreased after this time. This caused compression of the occupation and mixing of the cultural remains due to bioturbation vegetation, and historic disturbance.

The Mississippian occupations at the surface of the sites are

light and usually mixed. The sites were probably intermittently used.

Site Use

Determining which cultural activities were performed at the midden mounds is difficult. It has been addressed by a diffuse approach in previous investigations of the Tenn-Tom midden. These sites are complex because they are multi-component and possibly had different functions during each cultural period. The lack of specific problem-oriented research has also hampered the interpretation of these middens. The survey and testing work were aimed at evaluating the data contained within these sites. Our previous and current investigations at the midden mounds, especially Sites 22IT581, 22IT576 and 22IT539, have been structured to determine the specific reasons for site selection, revisitation and function. By integrating all the available information, some patterns can be determined.

The midden mounds' occupations can be roughly separated into four periods: Late Paleo-Indian to Middle Archaic (9,000-4,000 BC), late Middle Archaic (4,000-3,000 BC), Late Archaic through Woodland (3,000 BC-AD 900), and Mississippian (AD 900-1300). These units appear to be internally consistent based on cultural activities, artifact assemblages, techologies, facilities, and types of occupation. It must be noted that this grouping is preliminary and is based on varying recovery methods, analyses, interpretations, and availability of unpublished information.

The Late Paleo-Indian, Transitional Dalton, and Early Archaic occupations of the middens have been encountered in at least

seven of the 17 sites (41%) which have been tested or excavated. The Middle Archaic stage witnesses the initial occupation of the remaining 10 middens. The sites appear to have transitory camps for hunting, gathering, and processing natural resources. Chipped stone tools were manufactured, used, and either broken or discarded on the site. Ground stone tools were also produced. Most of the features were pits (probably storage/refuse) and indicate some residential stability. The organization of the features is not well understood at this time.

The late Midden Archaic occupation (Benton: 4,000-3,000 BC) presents a change in site use from a transitory to a base camp. So far, this is the most identifiable cultural zone in the midden mounds. The most common features are fired clay areas and hearths. Pits, postmolds, and blade caches also occur regularly. The pits and general matrix contain abundant charred hickory nut shells and wood charcoal. The variety of floral and faunal remains indicates diverse economic pursuits. The artifact assemblage contains a wide range of tool types which commonly exhibit reworking, such as celts, axes, chipped stone tools, and debitage. This indicates that only the final stages of manufacture were performed on the site. It appears that the early Late Archaic midden mounds were seasonal basecamps if they were not occupied throughout the economic cycle.

The remainder of the Late Archaic has not been well defined in the midden mounds. This is due to either the absence, mixing, or inadequate sampling of these occupations. The Mud Creek Site appears to have a thick Late Archaic deposit, but further work is needed to adequately define it.

The Gulf Formational and Woodland occupations are consistently present in the midden mounds although the deposits are usually mixed. Testing data from Sites 22IT590, 22MO710 and the Hickory Mound indicate that the Gulf Formational deposits may be in situ. In this project, we will palce an emphais on the Gulf Formational components because they are not well understood.

The Woodland midden mound deposits are usually disturbed and the features are difficult to isolate: our understanding of the occupations is therefore poor. The features and thin deposits of Woodland material suggest that they were used as intermittent transitory camps. In Site 22IT581, a small mound (15 m in diameter), a Miller II deposit was encountered in situ and revealed a possible structure, several storage/refuse pits, and evidence of chipped stone tools and manufactured ceramics. A wide variety of tool types were also found.

The Mississippian occupation of the midden mound is usually limited to a few sherds on the surface. We infer that the sites were occasionally visited.

The sum, the use of the Tombigbee Valley and Yellow Creek Valley midden mounds changed through time, but the economic activities probably continued to be heavily oriented toward hunting, gathering, and fishing, at least through the Woodland stage. The most intensive occupation of this area was during the early Late Archaic stage of Benton period. At this time, the site swere used for seasonal basecamps, if not permanent camps. The earlier occupations appear to be more similar to each other and differ from the Benton period, which can be used as comparative baseline. We do not adequately understand the use of the site after the Benton period.

Summary

The Upper Tombigbee and Yallow Creek midden mounds have been studied since 1974. From that time investigations at all levels (survey, testing, and excavation) have been conducted by more than nine organizations, represented by a variety of research designs. Appendix A contains the data from the six sites we will test in the project outlined here.

The midden mound investigations in the UTV and YCV have produced several consistent patterns which are presented below.

1. The midden mounds in the UTV are located on the forward edge of the Holocene Terrace from Columbus, Mississippi to the confluence of the Tombigbee River and Bull Mountain Creek. To the north of this confluence, midden mounds are located only in the active flood plain of the Tombigbee River, Mackeys Creek, and Yellow Creek.
2. The stratigraphy observed in the midden mounds can be divided into two units: dark brown loam in the "midden" and the older yellow-brown soil in the "sub-midden". Micro-strata can be discerned in this lower unit.
3. The soil in the sites appears to be alluvial, consisting of point bar build-up and overbank deposits. Little if any loading is suggested.
4. The midden mounds' occupations span the extent of Southeastern culture history: Paleo-Indian through Mississippian. The most intense use appears to be during the early Late Archaic (Benton: 4,000-3,000 B.C.).
5. The use of the sites varies through time from transitory

camps (Paleo-Indian, Dalton, Early Archaic), to intermittent camps (Mississippian, Woodland, Gulf Formational, Late Archaic) to basecamps (early Late Archaic).

6. The reasons for site use appear to be hunting, gathering, fishing, processing raw resources, and residence. These activities seem to be consistent through time.

THE EXPECTED ARCHAEOLOGICAL RECORD

The archaeological record expected in our investigations will be generated from three lines of evidence. The first is the information from previous investigations of sites we will excavate (Appendix A). The second is the record of investigations in midden mounds outside this area. This is limited to the Upper Poteau Valley of the Arkansas River Drainage in Oklahoma. The third is the assumption that the occupants of the sites were hunter-gatherers. This assumption and the models of behavioral correlates generated from ethrographic studies can be expressed in terms of the expected archaeological data of prehistoric hunters and gatherers.

By integrating these factors we predict the archaeological record we expect in future midden mound investigations. This is presented in tabular form below and is organized by: (1) site selection and morphogeneses, (2) the hunting and gathering adaptation to the eastern decideous forests.

In the Upper Tombigbee and Yellow Creek Valleys the Holocene environmental changes are reflected in specific drainage

Table 2: Site Selection and Morphogenesis Variables

Processes	Expected Archaeological Record
Site selection	Flowing water; wetland; moderate to well drained soil; presence of necessary natural resources.
Holocene environment; dynamic	Deposit on sites of overbank sediments or point bar buildup. Mixed cultural material dispersed in relatively thick deposits. Good isolation of occupation surfaces and associated features. Deposits thickest in epicenter of site due to nature of deposition and erosion of edges. This area contains the most human activity due to drainage and elevation. Artifact density, features, and activity areas decrease from epicenter to site edges.

organizations, corresponding vegetation, the soil dynamics. Human interaction with the environment is an important aspect of this adaptation. The first factor to be addressed in the expected record will be site selection and morphogenesis. We think that site selection variables will include drainage, water, and human maximization of economic resources (Table 2). The sites dating to the Holocene environment during the midden mounds' occupation are either dynamic or stable. Both conditions have implications for the nature of the archaeological record (Table 2). In a dynamic Holocene environment in this region, deposition and subsequent preservation occurs through burial. In a stable environment, deposition is rare and the remains of cultural activities are more concentrated. Table 3 presents the integration of the environmental models and the chronological models in the UTV and YCV. The expected archaeological deposits are presented in Table 3.

The types of activities that took place on the sites are considered in terms of the expected archaeological record (Table 4 and 5). The activities are grouped after Wolynec (1977), who utilized ethnological, ethnoarchaeological, and archaeological data.

We do not believe we have anticipated all of the prehistoric hunting and gathering activities in the Upper Tombigbee Valley. This is a beginning however, and demonstrates our approach to this investigation.

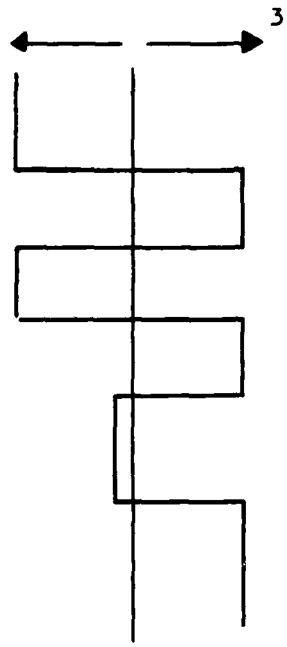
In the most simple view we might expect the combination of a limited number of variables. Raw materials included stone, bone, clay, and wood, and were used to produce tools, vessels,

Table 4: Site Selection and Morphogenesis Variables

Processes	Expected Archaeological Record
Holocene environment; stable	Lack of deposition on sites and consistent available occupation surface. Soil genesis will be in. Cultural material and features more dense per unit volume. Occupation of peripheral site areas. Diverse activities, including these that are non-utilitarian.
Human occupation	Predisposition for increased overall vegetative cover due to increase in organic material in soil. Disturbed vegetation types (weeds and shrubs) increase during site abandonment. Concentration of fauna in soil (earthworms, crawfish, beaver, moles, etc.).

Table 3: Integration of the Holocene Environment, Cultural Period, and Resulting Expected Deposits on Archaeological Sites

Year BP	Dynamic[1]	Stable[2]	Cultural Period
12,000 -- (10,000BC)			Late Paleo-Indian, Transitional Dalton
10,000 -- (8,000 BC)			Early Archaic (Kirk)
8,000 -- (6,000 BC)			Middle Archaic
6,000 -- (4,000 BC)			Late Middle Archaic (Benton)
5,000 -- (3,000 BC)			Late Archaic
1,000 BC -- 0			Gulf Formational Woodland
0 -- 2,000 AD			Mississippian



[1]Deposition on sites; thick deposits; low artifacts and features per unit volume; lack of mixing.

[2]Lack of deposition on sites; thin deposits; high artifacts and features per unit volume; soil development; more mixing.

[3]Intensity

Table 4: Hunting and Gathering Activities

<u>Bone</u> <u>and</u> <u>Shell</u>
- Intentional burial
- Food discarded before consumption
- Food discarded during consumption

<u>Stone</u>
- Manufacture
- Use
- Storage
- Decoration

<u>Ceramics</u>
- Manufacture
- Use
- Discard
- Decoration

<u>Fire</u>
- Use of fire in general
- Burning
- Uses of fire:
    - Warmth and light
    - Sanitation
    - Cache
    - Smudge
    - Feeder
- Fireplace Cleaning
- Food preparation

<u>Shelter</u>
- Floor
- Wall
- Contents

<u>Burial</u>
- Prepared
- Unprepared
- Location

Table 5: Expected Remains from Hunting and Gathering Activities

Activity	Expected Archaeological Record
BONE AND SHELL	
Intentional burial	Articulated animal skeletons; prepared pit or container.
Food discarded before consumption:	
Butchering	Selected bones; butchering marks; butchering tools; pit or surface deposits.
Drying and Pounding	Bone slivers; no bone remains.
Food discarded during consumption:	
Near cooking facility	Inedibles discarded near cooking facility; if in fire, signs of direct burning (calcination).
Away from cooking facility	Surface areas of concentrated garbage; pits with concentrated garbage.
STONE	
Manufacture:	
Raw Material	Unmodified cobbles; cores; blanks
Manufacturing tools	Hammerstones; bone and antler billets; pressure flakers; stone showing the manufacturing steps.
By-products	Chipped debris specific to the lithic technology.
Use	Broken, reshaped and lost tools in areas when they were used.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
STONE (cont.)	
Storage	Caches of unmodified cobbles, preforms or finished tools for future use in pits or concentrations.
Decoration	If made on site, debitage and the stages of manufacture will be present in highly variable context; if not made on site, only finished tools will be present.
CERAMICS	
Manufacture:	
Clay preparation	Areas of clay; off-site sources visible in color and texture different than site matrix; residue from molding, coiling (lumps, short coils), and shatter.
Firing:	
in closed fire	Subsurface or surface fire; if incorrectly fired, exploded ceramic fragments present; ceramics dark brown to black.
in open fire	Surface or subsurface fire; possibly exploded fragments; ceramics reddish orange.
No manufacture on site	Lack of firing and clay preparation area; clays and tempers used not available locally.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
CERAMICS (cont.)	
Use:	
General	Sherds scattered on site, concentrated in areas of use; holes drilled in vessels to stop cracks or to suspend vessels.
Cooking	Large vessels (4-8 lb) for boiling (esp. stews); podal supports, conoidal bases, or flat bases for placement in fire; flame marks on lower portions of cooking vessels; differential refiring of basal portions of vessels due to continued placement in ashes; residue on inside of vessels; concentration of broken sherds near fires (surface or subsurface) due to use and breakage; some sherds in fire; probably either plain or not extensively decorated.
storage	Concentrations of vessels away from fires; probably in pits; no burnt soil in or on walls of pit.
eating	Small vessels (1-3 lb); lack of basal modification necessary for cooking; lack of flame marks; probably well decorated.
Discard	Concentrations of sherds of many kinds of vessels in either a pit or refuse dump, incomplete vessels.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
CERAMICS (cont.)	
Decoration:	
Utilitarian vessels, cooking	Plain or poorly decorated; if decorated, will be in the style of the cultural phase of the upper valley.
Non-utilitarian, imported	Well decorated and completely designed; obviously different clay (non-local); decoration different from cultural phase in the valley.
FIRE	
Use of fire in general	Ash, charcoal, burnt soil (midden or brought-in soil).
Burning conditions:	
Surface-open	Ash, charcoal, burnt soil; more ash than charcoal if long-burning fire.
Surface-closed	Thin deposit: ash, charcoal, burnt soil; little ash if charcoal temperature reduced below kindling point prior to exposure.
Subsurface-open	Pit; ash, charcoal, burnt soil; more charcoal than ash due to incomplete combustion.
Subsurface-closed	Pit; little ash; charcoal and burnt soil.
Use of Fire:	
Fire for warmth and/or light	Surface or subsurface; no other remains necessary; inside or outside structure.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
FIRE (cont.)	
Uses of Fire (cont.)	
Fire for sanitation	Subsurfacce or open fire; garbage remains preserved due to burning.
Fire Cache:	
If ash used to bank coals	Narrow deep pit; ash remains if coals removed; both ash and charcoal if coals not removed.
If only charcoal	Narrow deep pit; empty if coals removed completely; charcoal if coals incompletely removed.
Smudge Pit	Subsurface closed fire; narrow deep pit; charcoal poorly combusted.
Feeder Fire	Surface or subsurface open fire; size varies with portable heat needed; in vicinity of other fire(s); if used to heat stone, then stones showing heat discoloration or fracture may be present.
Fireplace cleaning:	
Contents removed	Only ash, burnt soil and possibly charcoal.
Contents not removed	Same as above, but in vicinity of fire.
Fire for food preparation:	
Roasting	Postholes locating spit or tripod stone rings.
Baking;	
Directly in ashes or coals	Open surface or subsurface fire.
Removal of food	Ash and charcoal in central area and/or to each side; disrupted fire remains.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
FIRE (cont.)	
Fire for Food Preparation (cont.)	
Baking by coating	Open subsurface or surface fire; masses of burnt soil on or near fire; disruption of ash and charcoal from removal.
Heap oven	Surface closed fire; disruption from removal; stone (if used) discolored and fractured.
Pit oven	Subsurface closed fire; hot stone or charcoal feeder fire with pit, if supplied in this manner.
Frying on hot stones	Open or subsurface fire; heat discolored or fractured flat stone in or near fire.
Parching	Hot stone or coal feeder fire; charcoal, or heat discolored or fractured stone in feeder fire, if used.
Boiling	
Hot stone	Hot stone feeder fire; shattered stone; if in pouch or basket, heat discolored and/or factured stone will occur alone; if in put, this will occur in otherwise empty pit; if pit lined with mud then burnt solid mud will line pit with thermally altered stone.
SHELTER	
Floor:	
Prepared flat floor on surface using available soil or other natural material	Platform of soil which is either compacted midden or soil from off site.

Table 5: Expected Remains from Hunting and Gathering Activities (continued)

Activity	Expected Archaeological Record
SHELTER (cont.)	
Floor:	
Prepared flat floor below surface	Large pit with flat floor cut in surface of occupations zone.
Unprepared floor	No evidence of floor; platform of compacted midden.
Wall:	
Imbedded in woil	Post molds; wall trenches.
Freestanding	Small areas of stained soil showing outline.
Contents	Storage pits; fires; tools; patterning.
BURIAL	
Prepared:	
Container	Skeleton in pit.
Cremation	Chared bone and ash.
Primary	Articulated skeleton.
Secondary	Disarticulate bones.
Mutilation	Missing bones: damaged bones; direct disarticulation.
Grave Goods	Items in immediate contact of skeleton.
Unprepared	No container or pit; not layed out; no grave goods.
Location	
Specialized	Prepared burials in cluster; if cemetary area, then few other remains.
Non-Specialized	Prepared burials in areas of other activities.

shelters, and clothing. Food resources were either vegetable and animal. These are predictable in the past and are outlined in the ethnographic record. We will explore all avenues of information which could be preserved in the archaeological record. These are botanical (pollen, phytoliths, seeds, nuts, and charcoal), zoological (bones, scales, and teeth), and technological (lithics, ceramics, basketry, and woodworking). The physical nature of the sites needs to be well understood in order to comprehend the archaeological record they contain. Understanding the hunting and gathering lifestyle will help us integrate this data to explain prehistoric human adaptation to the UTV.

HYPOTHETICAL MODEL OF PREHISTORIC LIFESTYLES IN THE UPPER TOMBIGBEE VALLEY

INTRODUCTION

This hypothetical model or scenario of the prehistoric lifestyles in the Upper Tombigbee Valley is based on information presented in the preceding sections. Specific references have been left out because they are either discussed in detail above or elsewhere (Dye 1980).

According to Hudson (1976), the interior historic Southeastern Indians divided the economic year into two major subsistence periods of warm and cool seasons, divided by the autumnal and vernal equinoses. Subsistence scheduling was partially directed by the seasonal availability of plants and animals, but the great productivity of the deciduous forest floodplain and the aboriginal orientation toward it did not always necessitate settlement changes throughout the year.

Dye (1980, 1977) has applied Hudson's formulation of historic subsistence patterns to the prehistoric economic strategies of the western Middle Tennessee Valley inhabitants. This model is used here to predict the generlized, prehistoric subsistence and settlement patterns in the Upper Tombigbee Valley. We do expect some differences, but these should only help refine the model and make it directly applicable to the Upper Tombigbee Valley. We do expect some differences, but these should only help refine the model and make it directly applicable to the Upper Tombigbee Valley prehistoric cultures.

The model is based on ethnographic descriptions of the

hunting, fishing, and gathering activities of four historic Southeastern interior Indian groups. We assume that the historic Indian's hunting, fishing, and gathering patterns did not differ significantly from those of the earlier Archaic and Woodland Indians who occupied the area. We think that the adoption of horticulture may not have changed the basic structure of the early southeastern Indian foraging patters. Plant cultivation may have altered the seasonal round, but among the interior groups, hunting and fishing were possibly unchanged and gathering may not have been significantly altered from the Archaic pattern outlined by Caldwell (1958) and Dye (1980). The model is further augmented with archaeological information from the Midsouth and Midwest.

Subsistence and cultural ecology are emphasized because they are one of the primary conditioning factors of a culture. Within the confines of the archaeological record and its varying degrees of preservation, economic activities are more readily accessable than information concerning the ideological and social organizational aspects of culture. Economic patterns can be interpreted through tool manufacture, use, and discard; subsistence strategies; and settlement patterns. Tool kits associated with these activities are important sources of information. The resulting implements are viewed as manifestations of human behavior and thus represent technological adaptations to the floodplain environment. Many tools unfortunately are subject to deterioration and the existing archaeological record is only a small part of the original inventory.

WARM SEASON

The beginning of the warm season was signaled by the early signs of spring. As new shoots and buds began to appear and animals became more active, the hunting and gathering folk began to move from their small upland camps back to the large floodplain base camps. During seasons of heavy spring rains, the families would stay in the uplands until the water receded. When the sites were first occupied, storage pits were opened and everyone feasted on dried and smoked foods that had been packed away from the previous autumn. New tools were constructed and traps and snares were built.

Women, aided by young girls and boys and elderly relatives, continued digging roots and tubers such as catbrier, groundnut, wild onion, nelumbo, and sassafras. Small garden plots may have been cleared to plant squash, gourd, chenopod, sumpweed, sunflower, maygrass, or knotweed. Small mammals, birds, reptiles, amphibians, and insects were caught and their eggs, larvae, or young were collected. Fresh strawberries were picked as were hackberries that remained on the trees from the previous year.

The digging stick was the single most important gathering implement. Fashioned from a solid pole, it was sometimes fire-hardened or tipped with a flint bit. The handle was often made from wood, bone, or antler. Baskets, bags, and nets were used to haul food back to camp.

Hunting activities continued throughout the early warm season, but they were less important now that fish were beginning to spawn. Stalking white-tailed deer was still an important

hunting activity, but the deer were harder to locate in the dense foliage and more difficult to call or decoy into shooting range than during their mating in the early cool season. Small game (raccoons, beaver, opossums, squirrels, rabbits, groundhogs, skunks, porcupine, mink, and fox) was hunted avidly throughout the year with blowguns, traps, and snares. They were, however, particularly susceptible in the spring months when they were seeking mates and new sources of food. Traps, dead-falls, and snares, baited at dusk and checked in the early morning hours, were set in the water or along the edges of swamps, oxbow lakes, and creeks for muskrat, beaver, skunk, opossum, and raccoon, and along trails and at dens for other game. Some of the smaller animals were hunted with blowguns or dogs and clubs, while spears were used for larger game. Communal hunts or surround drives were sometimes organized to flush game from the underbrush or cane thickets.

Birds were taken more easily in the spring when turkeys, passenger pigeons, waterfowl, and quail were hunted with box traps, snares, and blowguns. Passenger pigeons were knocked out of trees with long poles or shot with blowguns during the spring roosts. Waterfowl and turkeys were avidly sought during their mating season because they could be called into shooting range. Many birds were hunted in the spring for their plumage, which began to molt in early summer.

If these activities took place as described, we would expect to find cutting, piercing, and scraping tools, in addition to maintenance debris, in the warm season camps. This assemblage would produce the following artifacts: projectile point/knives,

knives, denticulates, choppers, flakes, blades, and atlatl weights.

During the early warm season spawning runs, baited traps or creels set near shoals and deep pools were used to catch fish and turtles. Gorge hooks were baited and tied to overhanging trees along the stream banks. They were checked and baited with meat daily. Nets, seines, and weirs were important for catching a variety of fish such as gar, drum, sunfish, sucker, perch, red horse, catfish, and rockfish. These fish were often speared from the banks of small backwater pools, sloughs, and oxbow lakes. Fishhooks and net sinkers should remain from fishing activities.

The early warm season foods were usually prepared by the women. Few were eaten raw. In addition to roasted or broiled game, or roasted or baked fish, the most basic foods were stews or soups and breads. Stews usually consisted of fish, meat, pounded and sifted tuber or root meal boiled in water with bear oil, and additions such as eggs, vegetables, pounded bone marrow, wood ashes, or dried nutmeats. Young sassafras leaves of pith were added to thicken it, and meat was usually shredded or pounded whenever it was used. The stews were cooked by heating river cobbles, sandstone fragments, or limestone nodules and dropping them into skin bags or tightly woven baskets until the liquid was sifficiently heated. Bread was made from tubers or roots that had been ground into a meal after baking. Occasionally vegetables, dried nuts, or seeds were added to the batter. Small game was roasted. Whitetailed deer were similarly cooked. An early warm season drink was made from sassafras gathered before the sap rose and then boiled in water. Food pro-

cessing should be evidenced by the following tool assemblage: mullers, mortars, pitted anvilstones, digging implements, choppers, hammerstones, denticulated, knives, and combination ground stone tools.

As the early warm season developed into the hot days of the late warm season, daily village life slowly changed with the weather and the availability of the local plants and animals. It was the hottest time of the year. The women were busy gathering plants and trapping small game. Men hunted during the dawn hours and again at dusk. The men checked their snares in the morning for small game and reset them in the afternoon. They also checked their fish traps, weirs, and lines in the early hours of the morning and baited them at sundown. Most of the communal fishing took place during the day.

Roots and tubers continued to be important ingredients for bread and stew, but now berries such as blackberries, huckleberries, red mulberries, blueberries, elderberries, raspberries, and fruits such as grapes, plums, maypops, black cherries, pawpaws, and blackhaw were ripening. They were either eaten fresh, dried for later use, or added to bread. The women and their helpers used long poles and digging sticks to knock the fruits from the trees, bushes, and vines, while young men and women climbed the trees and shook the vines and limbs. Berries and fruits were taken back to the village in split cane baskets and leather bags. Mussels and snails were gathered from the shallow water and cooked and eaten in the village.

Wood-working was an important summer activity. An assemblage associated with woodworking activities might include such things

as: chisel-adzes, axes, wedges, pieces esquilles, knives, notched flakes-spokeshaves, scrapers, drills, reamers, perforators, denticulates, choppers, sanstone abraders, and utilized flakes.

The major emphasis on everyone's part was to help with the communal fish poisonings during the late warm season. Traps set in deep pools were baited and weirs and traps were set in shallow shoals. Small pools were poisoned either with devil's shoestring roots, Carolina moonseed berries, Ohio buckeye seeds, or green walnut hulls. The fish poisonings each year were social occasions. Everyone helped with the catch. The men poisoned the pools and kept the water stirred while young men speared fish such as catfish, gar, freshwater drum, sucker, and sunfish as they floated to the surface. The women caught the fish as they were thrown on shore and put them in woven, split cane baskets. Drags and seines were hauled through the water. Turtles and fish were then thrown onto the shore and carried away in large baskets. Some of the fish and turtles were eaten then, but most were taken back to the village and smoked slowly over a fire. The poison depleted the oxygen in the water and was not harmful to humans. Lines were set out across the open sloughs with gorges on them, other lines were set on low overhanging branches over the water and baited with meat at dusk and run in the early morning hours.

A short hunt was organized between the time when fish spawned and the season when they could be poisoned effectively in shallow pools. Sometimes a surround was used with dogs for rushing game toward a line of waiting hunters. Small game was regularly

caught with snares and traps baited with fruit or meat.

The food was prepared in the late warm season the same way as it was in the early warm season. Fresh fruits and berries were added to the diet. Late warm season drinks were made from peppermint, sumac, maypops, honeylocusts, or grapes.

COOL SEASON

The cool season usually started with the beginning of the nut and seed harvest and the white-tailed deer mating season. This was a major change in the subsistence patterns because it brought the summer reliance on fish, tubers, and berries to an end. The early cool season was the most plentiful portion of the economic schedule, while the late cool season brought the most disruptive changes to the aboriginal social and economic systems.

The early cools season began with the first cool nights of autumn and brought an end to the the long, hot summer days. Acorns, nuts, seeds, fruits, and deer now became available. The floodplain villages along the river seemed to awaken gradually from the accustomed slow, summer rhythms. The days were now noticeably shorter and the nights cooler. The people in the villages began preparing for the oncoming winter season and enjoyed the present harvest with a celebration of the forest's munificence.

The village women, their daughters, and older relatives collected the acorns as they began to ripen, shortly after the first frost. Some of the children climbed into the oaks and shook the other limbs. Woven baskets were filled with acorns and taken back to the village. Acorn meal soon began to replace root and

tuber meal. They also flailed and shook large numbers of hickory, beech, walnut, and chestnut seeds from the trees. In addition to the nutmeats eaten raw or dried for later use, the oil was used as a drink or replace bear oil for a variety of purposes, but primarily in soups and stews. The seeds of numerous plants such as cane, maygrass, giant ragweed, and chenopod were pounded or roasted and added to stews or bread. Any plants that were cultivated, either native or tropical, were now harvested for their seeds. The squash or gourd may have been used for containers. Small game was taken with traps and snares set close to favorite nut and acorn collecting grounds.

As gathering and hunting increased in importance during this crucial period of the year, *fishing* decreased as the weather cooled and the fish became less active.

White-tailed deer males become more aggressive as they near the rutting season and hunters used deer calls and decoys effectively to entice them within range to be killed with spears. As the dry leaves accumulated on the ground, surround drives were organized and fire was used in conjunction with dogs to herd the animals through a group of waiting hunters. Beaver, rabbit, raccoon, and opossum were hunted at night with traps and snares, while deer and turkey were hunted during the early morning and late afternoon with calls and decoys. Passenger pigeons and waterfowl were hunted with traps, snares, nets, and blowguns. Hide and leather working activities could include the following tools: scrapers (end-side, steep edge), perforators, gravers, and utilized flakes. Bone working activities might include such items as: drills, pieces esquilles, burinated bifaces, wedges,

gravers, notched flakes-spokeshaves, scrapers, drills, reamers, perforators, denticulates, choppers, sandstone abraders, and utilized flakes.

The shift from the early to the late cool season was the most drastic in the economic cycle. With the end of the seed and nut harvest and the deer rutting season, and before the winter floods, many of the families stored their heavy equipment, packed their storage pits, and left the floodplain villages. They scattered throughout the uplands in family groups along the tributaries of the larger streams and rivers. The older members of the families and the children who were too young to make the journey stayed in the floodplain villages.

As the foraged throughout the uplands, they collected any remaining nuts and seeds they could find an dug tubers and roots from the ground. Gathering was difficult because the plants and small animals were scarce. Roots became the primary object of the women's activities, although all food items were eagerly searched out.

Fishing was almost non-existent. Fish were least active during this time of year, but when they were found in the shallow, upland streams they were caught with spears or nets.

Hunters continued stalking deer and running them with dogs. Small game was trapped and snared along creeks and springs. Bear and raccoons were smoked out of denning trees and speared.

The pattern of movement followed the familiar trails and paths through the uplands, camping in one traditional area one time and seeking a new area the next. Caves and rock shelters were sought when the weather was particularly harsh.

SUMMARY

The scenario or hypothetical model presented above has been based on recent reviews of the ethnohistoric literature (Dye 1980; Hudson 1976) and syntheses of the aboriginal cultures who occupied the Midwest and Midsouth in the prehistoric past. This resulted in an economic model of prehistoric hunting and gathering lifestyles in the Upper Tombigbee Valley. Detailed compilation of data has been presented either above or in other works (Dye 1977, 1980).

This approach is important because it allows us to detail the economic orientation of an archaeological culture and examines other associated aspects such as ideology and social organization. This cultural ecology emphasis is the most pragmatic way to view past hunting and gathering societies. It is especially useful for determining the various activities associated with foraging groups throughout their economic cycle.

STRATEGY

STRUCTURE

The project will be organized into a team approach. See Appendix B for project structure and Appendix D for job descriptions. The senior staff of the project (principal investigator, field directors, and laboratory directors) combine strong multilevel archaeological experience and individual specialties and talents. The senior staff will make all decisions concerning the operation of the project. The principal investigator will be a part of this team and will be responsible for all decisions. The mid-level staff (field and laboratory assistants) complement the senior staff. The junior level staff (team leaders) bring strength to all mid-level positions.

The entire project will be aided by a group of outside consultants which will guide and monitor recovery and preliminary analysis of specific data sets. Each consultant will present guidelines to the senior staff on the recovery, analysis, processing, and storage of specimens or samples. The consultants will evaluate the information and if possible perform intensive analysis integration in Phase 3 of the project.

The senior staff for this project realized that their combined professional experience, while extensive, is not totally inclusive. The consultants allow more informed decision-making. It is important to become informed on the current knowledge in the Upper Tombigbee and in special outside disciplines. In our opinion, the transfer and feedback of information between the archaeologists is the only means of maintaining the most produc-

tive track throughout this long project.

In addition to professional archaeologists and specialists, a complex project requires sound personnel and fiscal management. The addition of a project manager, a project administrator, and a project bookkeeper, and the tracking of progress by the Director of the office, builds in a level of support and cross-checks which make possible the isolation of problems in the project before they cause a breakdown. The management personnel remove the burden of work from the scientific personnel.

In sum, the investigative approach proposed for this project is an empirical one. The scientific and management personnel will provide support and information exchange at all levels to maintain the proposed schedule. Phase 1 will aim to produce data which is controlled and useful. The interim report will present the retrieved data. An evaluation of all data sets will be made at the end of Phase 1. This will determine the most useful areas to concentrate on in the intensive analysis of Phase 3. The integration of the data and production of reports will constitute the final phase of the project.

METHODS

The method of reconstructing the past lifeways of the inhabitants of the six sites to be investigated is simple: control and feedback of data. Archaeological investigations produce several kinds of data:

1) Cultural remains: Artifacts, features and structures.
2) Environmental remains: Flora, fauna, pollen, biosilicates and lipis.

3) Depositional remains: Site construction, micro-stratigraphy, geomorphology (local and areal), depositional environment, soil formation and interaction of natural and human forces.

These data sets are interdependent. They form the basis for interpretation of the behavior that resulted in the distribution of the data in space.

The production of usable data is accomplished by basic field and laboratory control techniques performed by experienced and informed professionals. The production of this information must be scheduled and organized within the limitations of available time and funds as set forth in the Scope-of-Work. The proposed schedule for this project is presented in separate sections below. The premise for these specific outlines is continual information flow. However, a basic set of information must be understood prior to data recover. The initial transfer of knowledge will occur during a 10 day Intensive Seminar conducted at the beginning of the project (See Attachment C for the Instensive Seminar Schedule). The seminar will be required for all supervisory personnel. The topics will include: (1) the most recent prehistoric chronology and information on the Tennessee-Tombigbee Waterway and adjacent regions; (2) the identification of artifact types which will be encountered in the mitigation project and their positions in the chronology; (3) a workshop in ceramic and lithic artifact types for all supervisors; (4) complete briefing on bagging, tagging, ID numbers and additional control procedures; and (5) detailed instructions on the procurement, processing, and storage of specialized

artifactural remains by the pertinent outside consultants.

The Intensive Seminar will inform all supervisory personnel of the project's theory, objectives, organization, and procedures. It will familiarize them with the specific artifact types and their meaning, providing increased sensitivity in the field and lab. Emerging from this Intensive Seminar will be an organized, informed team with understood responsibilities and schedules. The last two days of the Intensive Seminar will be a review session which will include all crew members participating in the investigation of the first site.

PROJECT STRATEGY

The objectives of Phase 1 are threefold: to recover data in a controlled manner, to obtain the highest level of information concerning the recovered data, and to understand the nature of the former occupations of the sites under investigation. This will be done by the interaction of three systems: data recovery, data analysis, and data management. The separation of these systems for the purpose of explanation is difficult, since one cannot operate without the others. Two teams will perform data recovery at each site; both the field and laboratory (Figure 13). The data management system orders and stores all information produced. Decisions regarding excavation strategy, crew management and data retrieval will center around the data management system. With this system, cultural stratigraphy can possibly be predicted. Information on cultural stratigraphy can be updated daily.

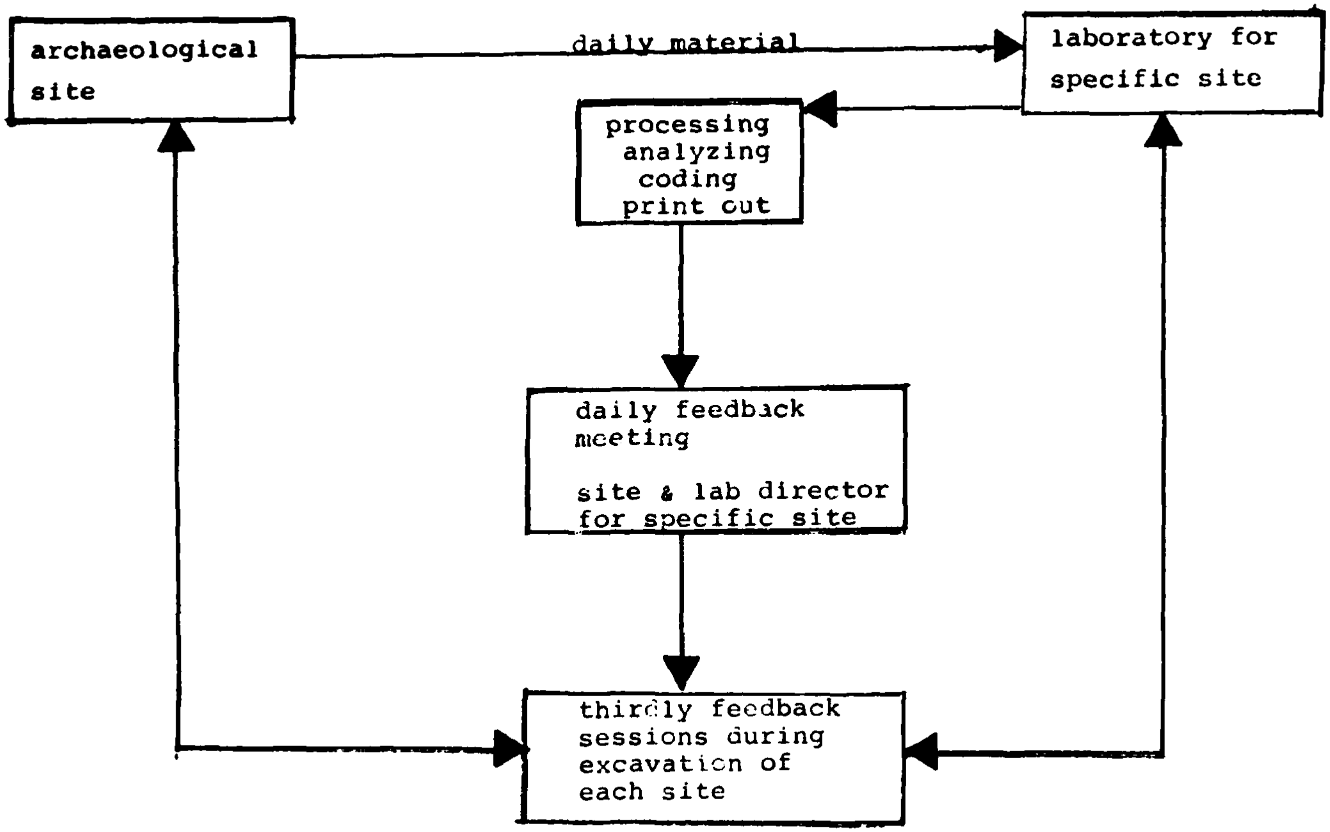


FIGURE 13. Information Flow Chart

Due to the lack of visible stratigraphy and the need to know what is being excavated in order to make sound field decisions, a turn-around time of 24 hours is proposed for all material. All specimens will be washed, sorted, analyzed, and cataloged the day after they are excavated. This information will be coded and entered into an in-house computer system and systematically stored in the State of Florida data bank. Daily syntheses of the material analysis will be generated by the site laboratory directors. Briefings between site, lab, and field directors will be held reach day to plan the excavation strategy for the next day. This procedure will maintain the highest possible level of information for the site directors and will form the basis of all decisions concerning data recovery. The laboratory director will literally guide the field director in the data recovery process.

The method of data recovery will be by block excavation units. On each multi-component site a large block excavation unit and at least two smaller cross-check units in different areas of the site will be completed. Excavation will be primarly by hand due to the complexity of isolating historical units. Backhoe trenched will be utilized for stratigraphic purposes.

FIELD STRATEGY

EXPECTATIONS

The complexity of the midden mounds, in terms of dispositional history and intrasite cultural associations, is apparent from the Upper Tombigbee Valley testing data (Appendix A and Bense 1979 a,b,c), and investigations at similar site (Galm, 1978 a,b,c). The field strategy designed should maximize the data

retrieval consistant with the project research objectives. In a multisite project the procedures employed need to be standardized to insure comparability. At the same time the strategy must be flexable enough to allow the most thorough excavation possible of the individual sites.

The testing of the sites indicates that they contain visually identifiable, but not necessarily distinct, stratigraphy. Cultural components should be differnetially distributed, vertically and horizontally, and burned soil or clay areas, which are possible living surfaces, may be present (Bense 1979 a,b,c). Pit features are also expected, but their definition is likely to be unclear due to floral and faunal disturbance, and the generally homogeneous, mixed appearance of the midden deposits.

GRID PLACEMENT, MAPPING AND PROVENIENCE CONTROL

The metric system of measurement will be employed on all project excavations.

At least one benchmark with a known or an arbitrary elevation is to be extablished on each site. If an arbitrary datum is used it will be set at 100 m. All benchmarks with arbitrary elevations will eventually be tied to benchmarks with known elevations.

Vertical control of the excavations and topographic mapping of the site will be based on the main benchmark. Additional benchmarks will be established on the site as dictated by need. Elevations will be determined through use of a transit or builder's level and leveling rod.

A horizontal Cartesian grid will be arbitrarily established with the 0-0 point of the grid to the northeast of the site. This places the entire site in the southwest quadrant of the grid. A horizontal benchmark will be set on the site and given arbitrary coordinates (e.g. 100S/100W). This point will then be used to establish a physical grid on the site. Baselines and grid stakes will be set out to aid in mapping the site, placing cores, and establishing excavation units. All units are designated by the coordinates of their northeast corner.

The basic unit of general excavation will be a 2 by 2 m square. This size is convenient to work in and is easily divided or multiplied. Contiguous sets of squares will be excavated as larger blocks. Natural strata will be employed as guides for excavation if practical, but previous testing indicates that strata boundaries will be difficult to follow while excavating. It is expected that 10 cm levels will be employed in most excavations, with sub-levels or changes in the defined level thickness being used as dictated by site conditions. Two by two by 0.1 units can be subdivided vertically and horizontally into smaller units. A unique identification number (ID) will be assigned to each level of a 2 by 2 m excavation unit and any vertical or horizontal subdivisions of such units. Features, subdivisions of features, special samples, and plotted specimens will all receive unique ID numbers.

PLACEMENT OF EXCAVATION UNITS

A number of factors will be evaluated in determining the placement of the excavation units on the sites. The individual

differences in the sites will determine the relative importance of each factor. Sites to be tested will necessarily be treated differently than sites undergoing major excavation. The process of excavation unit and stratigraphic trench placement is schematically shown in Figure 14.

Minor excavation units (usually 2 by 2 m or 4 by 4 m) will be located to sample representative topographical areas of the sites which have not previously been tested, such as the periphery. Avoiding surface disturbance, they will be used to investigate anomalies and homogeneous areas observed in chemical and visual cores.

Major excavation units are planned to provide data for the reconstruction of activity areas. This will be accomplished by opening up large horizontal areas so that associations among features and artifacts can be investigated. It is hoped that by centering large units over possible hearths or living floors (as identified by visual coring) associated features and artifacts will be identified around them.

The major excavation units will also provide large samples of the cultural deposits for analysis and comparison. A broader view of the site formational evidence and the extent of disturbance can be investigated.

Testing information from each site will be used to direct excavation units to promising deposits. The lack of testing data from areas of a site justifies the placement of small units in those areas.

Modern disturbance, in the form of potholes, tree tip-ups, and machine disturbance, will generally be avoided if all other

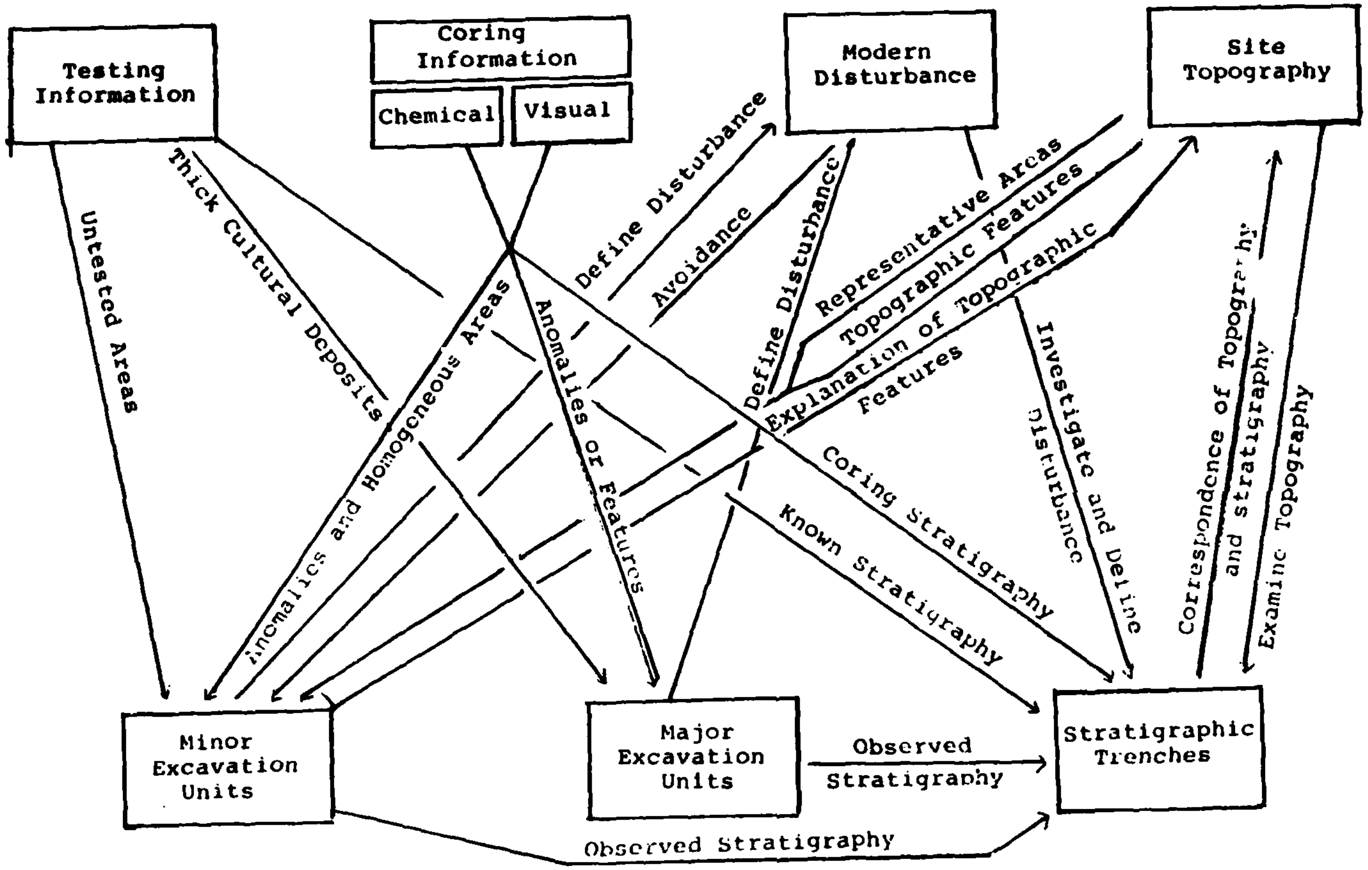


Figure 14. Placement process for Excavation Units and Stratigraphic Trenches

factors used in determination of unit placement are independent. Stratigic placement of units can be used to investigate modern disturbance where such information is benficial to site reconstruction.

The topography of the site is an important factor to be considered in placing the excavation units. Topographic anomalies and areas representative of the general site will be investigated. Units in the central portion and the periphery of the site will be excavated and compared for stratigraphic and artifactual differences.

Cores will be analyzed in two days: chemically and visually. Oakfield 3/4 inch Tube Samplers with extensions will be used to remove 20 cm plugs from the surface of the site to at least 60 cm below the suspected base of cultural deposits. Cores will be located on the site grid system, usually 50 cm south of even numbered grid intersections (e.g. at 152.55/140W). Chemical cores will usually be taken on an 8 m grid over the entire site, visual cores on a 2 m grid.

Each chemical core 20 cm plug will be given an indentification number, bagged, labeled, and taken to the laboratory. Visual descriptions of these cores will be made as they are removed from the ground. Tests will be performed in the laboratory to measure the pH, phosphate and calcium carbonate levels of each sample. Differences in chemical concentration may occur which can be related to the distribution of activity loci or intensity and duration of activities. The pH of cultural sediments should tend to be more basic than non-cultural sediments in this environment. Phosphates and calcium carbonates should

likewise be in higher concentrations in areas of culural activity. These tests will provide quantitative results which can be overlain on the site map to show how they correlate with visual core data and topographical features.

Visual cores will be used to systematically test a site for distinct visual anomalies such as fired clay and charcoal. Subtle soil color and textural changes cannot be detected using this coring technique. Cores taken on a 2 m grid should show isolated anomalies and concentrations which are extended more than 2 m horizontally. It is hoped that this technique will locate prepared living surfaces which have been fired or constructed of clean sand or clay. This technique is time consuming and will be employed according to expectations, site size, excavation schedule and preliminary coring results.

EXCAVATION OF UNITS

A 2 by 2 m square, as stated above, will be the standard horizontal excavation unit. The most common vertical subdivision of the 2 by 2 m square will be the 10 cm level. If a greater degree of provenience control is desired subdivisions of these units will be employed. The smallest subdivisions of these units will be employed. The smallest subdivision to be used is the plotted specimen, which is an individual specimen for which elevation and precise horizontal location have been determined.

The 2 by 2 excavation unit and the 10 cm vertical levels are arbitrary constructs employed to locate and group specimens. A feature is a real difference in fill color, texture, or composition which can be discerned in excavation. A feature is con-

sidered to be the result of temporally limited activity, either cultural or non-cultural. Since a feature represents a more limited moment in time than the accretionary deposits of a general midden it is excavated as an entity, superseding the arbitrary controls. Feature excavations are recorded within the parameters of the horizontal site grid and established elevations.

The fill removed from the general site and the features will be treated in several ways. Most of the site fill will be washed through quarter inch hardward cloth, when water is available, with all materials caught on the screen being bagged and taken to the laboratory for washing and preliminary analysis. Special samples from the general site fill and all feature fill will be processed to collect a wider range of data than is recoverable in a quarter inch mesh screen.

The following special samples will be retrieved as circumstances warrant:

1. Archaeomagnetic Dating
2. Macro Botanical
3. Carbon-14
4. Pollen
5. Soil or Sediment Size
6. Plotted Specimens
7. Biosilicate
8. Lipid
9. Perpetuity
10. Fine Screen (1/16 inch)

Certain 2 by 2 m excavation units, three or more in major

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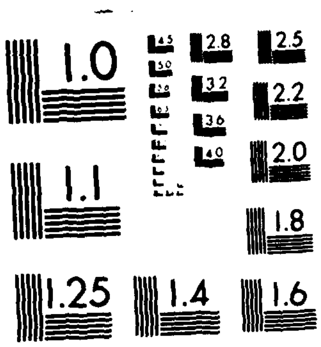

MICROCOPY RESOLUTION TEST CHART

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excavation units, will be selected for representative sampling -, special samples. A 1 by 1 m control block will be delineated for the removal of fine screen, macro botanical and pertuity samples. Pollen, biosilicate, and lipid samples will be removed from the control block perpetuity sample if need arises and funding allows.

SITE TESTING

Three sites will be tested during the project to determine the need for further mitigation. Ten to twenty work days will be spent on each of these sites. The purposes of testing are somewhat different that those of major excavation. The procedures employed are likewise different and reflect the limitations and goals of site testing.

Similar field procedures will be employed where possible to insure comparability of the testing data to excavations at other sites. The chief differences in strategy between testing and major excavation concern surface collection, unit placement, and unit size.

The testing sites will be defined initially by the surface artifact scatter and the topography. Topographic maps will be made and Cartesian grids established for the testing sites. At least 20 percent of the site surface will be sampled using the site grid for horizontal control. Collection units will be placed to sample all areas of the site and to test for the boundary of the site. Within the collection units 100 per cent of the artifacts will be collected. Information from local informants and visual inspection will be used to determine the recent

disturbance of the site.

Small test units (1 by 2 m and 2 by 2 m) will be placed in areas of minimal surface disturbance to sample representative areas of site. Units will be excavated in arbitrary levels to a depth 20 cm or more below the bottom of the cultural fill. The information from these test pits will be used to address questions of; horizontal and vertical cultural stratification, disturbance and mixing of site sediments, thickens and depositional history of the site, and presence and nature of festures within the site. All excavated fill will be screened through 1/4 inch or 1/16 inch screen. Special samples will be taken according to the material encountered.

Heavy machinery (e.g. a backhoe) will be used if further stratigraphic investigation is thought necessary by the site director.

STRATIGRAPHIC AND SITE FORMATIONAL INVESTIGATIONS

To supplement the limited view of stratigraphy afforded in the excavation units, backhoe trenches will be dug on the major sites. The number and placement of stratigraphic trenches will be based on input from the geomorphology and soil consultants, topographic anomalies, core data, and excavated units (Figure 14). Trenches will be placed to provide most of the site profile and to investigate the site edge as it grades into off-site profile and to investigate profiles of stratigraphic trenches and excavation units will be drawn and photographed.

SITE STRIPPING

The presence of substantially informative cultural stata, as

demonstrated in hand excavation units, may justify the use of heavy machinery to expose larger areas of the more important strata. The removal of sampled, but relatively unproductive, cultural deposits will allow more efficient, judicious, and thorough investigations of other deposits.

Due to time considerations only limited areas of the sites will be considered for stripping. Several strata on a site may warrant additional exposure. In such cases different strata will be exposed in different areas of the site.

PHOTOGRAPHIC CONTROL

Photo documentation will include the use of both color and black and white film. A log of the photographs will be maintained as they are taken. Frame number, date of exposure, camera settings, direction of exposure, photographer, and a description of the photograph will be recorded in the photo log at the time of exposure. A photo number, which is sequential for the site, will be added to the log after the film is processed.

The black and white photographs will be placed in a file according to photo number and in a cross-reference file according to subject class (e.g. features, profiles). The file cards will contain a contact print of the photo, the photo number, and the field information. Black and white negatives and color slides will be stored in plastic loose leaf sheets according to photo number. A cross-reference file will also be kept for the color slides.

LABORATORY FEEDBACK

Ongoing analysis of the recovered artifactual material and

manipulation of the laboratory data is expected to aid in guiding the excavations. The behavior of the feedback system in most cases will be informal and flexible to allow for the varying nature of the artifacts, the excavations, and the schedule. The excavation and laboratory feedback process is envisioned as similar to and organic system in the ecological sense, with all actions effecting and integrally related to all other actions within the system.

LAB STRATEGY

The laboratory analysis and data management strategy must look toward two goals. The first is to process the recovered specimens and data in a daily format to implement the feedback discussed in the overall and field strategy sections. The second is to organize and analyze the collections so that we will have access to any portion of the collection during Phase III.

Meeting the first goal will require a large lab staff in proportion to the field staff. Certain equipment, such as a mass dryer, scales, and lab screens, will also be necessary. The need for quick turn around time will require that certain analytical decisions will have to be made quickly. Mass debitage analysis will be used (Ahler 1975; Johnson n.d.). Also, procedures such as measuring and analyzing specific Projectile Point/Knives attributes will be delayed until Phase III, or if there is time they may be done within Phase I.

On the other hand, the information fed back to the field will require detailed analytical procedures to be pursued daily; for example, the identification of raw material of all lithic

specimens, and whether or not flakes have been utilized will be considered.

One type of information needed for quick interpretation is chronology. Certain chert types may sometimes be chronological indicators. Tallahatta quartzite is most frequent during the Middle Archaic period, and Ft. Payne chert is most common in the Late Archaic period. Other emphases of the research design require the identification of activity areas and other aspects of community plan such as refuse concentrations around living floors. This will require utilized flakes to be recognized during the daily analysis.

The following is a summary by material class of the proposed analysis for Phase I and some expected elements of Phase III.

CERAMICS

In Phase I, all ceramics from the sites will be screened through 1/2 inch mesh. Those sherds passing through the screen will be considered sherdlets and will be weighed as a group with no further analysis.

Sherds will be sorted by type, but not variety. This decision was made in conjunction with the project ceramic consultant for several reasons. First, most of the ceramics to be recovered are Gulf Formational types which were a minor aspect of the Gainesville ceramics (Jenkins 1979). Given the small sample size of the Gainesville material, and the potential for recognizable regional variability within the orante Alexander ceramics, it was believed that the most meaningful type variety analysis would come out of Phase III of this project. Also, given the shallow,

mixed nature of most of the Woodland and Mississippian components, the degree of temporal control given by types will be sufficient for all daily decision making processes. It is also the opinion of the ceramic consultant that given the small numbers of Woodland and Mississippian ceramics to be recovered by this project, assignment to the existing type variety classification could be done quickly and at lower cost by one person during Phase III. One the other hand, type-variety analysis may not be appropriate to the questions asked in Phase III, and may be eliminated from the program entirely.

After the ceramics are classified during Phase I, they will be further subdivided into diagnostic or non-diagnostic sherds. This is more useful tool for management than a rim-body dichotomy. The category diagnostic will include rims, bases, handles, and other sherds with particular stylistic or technological information beyond that implied by the type name. The non-diagnostic group will consist essentially of body sherds. Each group of sherds will be counted and weighed.

Phase III analysis of ceramics is projected to include a detailed analysis of selected ceramics. Technological and stylistc analysis is expected for the Gulf Formational ceramics and perhaps others. The analysis of the Alexander ceramics should include a precise attribute analysis aimed at recognizing specific technological and stylistic attributes and modes.

Krause (1978) has presented a set of concepts and methods appropriate to the development of formal accounts of ceramic manufacturing processes. In another paper, Krause and Thorne (1971) offer a set of logical considerations for the recognition

of those attributes which might be considered modes. Both of these papers offer a fruitful approach to detailed ceramic analysis.

LITHIC ARTIFACTS

As indicated in the earlier discussion of technology, the artifact categories developed for Phase I will be designed to reflect potential manufacturing sequence outcomes based on work in adjacent areas. These categories will be cross-cut by raw material to provide date on various aspects of raw material aquisition, lithic preference, and even chronology, as outlined in prior sections of this research design. The number of specimens in each category will be recorded.

Phase III analysis of these materials will consist in part of detailing and confirming the manufacturing sequences, stylistic and metric analyses, and wear pattern studies. The exact nature and extent of such studies will depend on the questions asked in Phase III.

LITHIC DEBITAGE

The lithic debitage from the sites will be sorted into flakes and chunks. Chuncks will be weighed. Flakes will be size graded into 1", 1/2", and 1/4" and sorted by the presence or absence of utilization and by chert type. Each category will be counted and weighed.

This is an application of mass debitage analysis is described by Ahler (1975, 1976). To quote from Ahler (1976:iii), "the procedure consists of, first, size grading flaking debris aggregates collected under conditions of known bias...from

archaeological excavation units, and then, recording data on a small number of observations on each size graded debris fraction." This method essentially stratifies the flake sample along a few axes. Once this is done, it is possible to more precisely characterize the entire sample with respect to models derived from replication experiments or detailed analysis of small sub-samples. Therefore, mass analysis may be considered an adjunct to these more detailed methods, rather than an alternative to them.

MASS DATA CATEGORIES

For Phase I, all we need to know about these catagories of material is quantity and provenience. In general these categories include various kinds of unmodified rock, fired clay, and fired cracked rocks.

SPECIAL SAMPLES

The special samples to be collected include soil, radiocarbon, pollen, biosilicates, macrobotanical, faunal, archaeomagnetic, lipid, perpetuity, and possibly others. The taking of these samples is described in the field strategy section. The main laboratory task associated with these samples is some preservation and preliminary processing.

Some of these samples will be processed during Phase I. This will aid in the ongoing evaluation of field and laboratory strategy, the preparation of the interim report, and the planning of Phase III. The exact number and kinds of samples submitted during Phase I will have to be determined on a case by case basis.

CATALOG AND STORAGE SYSTEM

The cataloging system will be designed to mesh with and complete the control begun in the field. A complete single catalog number will be in the following form: $\frac{\text{2-103}}{\text{22IT590}}$

The denominator is the site number. The numberator is a binominal term consisting of a provenience reference followed by a specimen reference.

The provenience reference will in each case be the same as the ID number assigned in the field and will also be used to organize data fed into the computer. The specimen reference will be keyed to the catalog sheet. Thus, the example above is to be interpreted as, Site 22IT590, ID number 2, specimen 103.

This system will require that two keys be maintained. One is a serial list by ID so that the represented provenience can be identified. The other is a list of proveniences so that the ID can be identified.

This cataloging system has proven to be of considerable use in research oriented collections for several reasons. Foremost, it is an open system. Specimens or proveniences can be added to the catalog as desired. In addition, specimen number blocks can be used without the specimen reference, if that is not desired or appropriate, for such things as samples of debris and soil.

The other aspect of the catalog system is the catalog form. Each line contains, minimally, one specimen. Maximally, one material category is put on a line. Usually, a combination of these are used. As an example, projectile points are usually listed individually, while debitage is generally listed by

category.

All sherds, lithic tools, and lithic artifacts, including utilized flakes, will be numbered. However, only 20% samples of flakes, sherdlets, fire cracked rock, and introduced rock will be numbered.

Bagging will be by the highest analytical category. Based on two analyzed units of 14 levels each from 22IT590, the following ranges of categories were observed:

	Maximum	Minimum	Mean
Ceramics	23	0	8
Chipped Stone	18	0	8
Pecked Ground Stone	3	0	1
Debitage	25	2	15
Other	13	3	9

Depending on volume, each category is sealed in a bag or, more often, a coin envelope. Each bag or envelope will receive a complete label; provenience, category, and catalog numbers. Some bags will be placed in other bags. For example all flakes from a unit will be bagged together. The artifacts will be placed in waterproof plastic bags with one label on the outside and a duplicate inside. All storage areas will have temperature and humidity control.

Boxing will be by ID and category. It is believed that this will facilitate access to specimens in Phase III when specific kinds of specimens will be needed more often than all material from specific proveniences.

DATA MANAGEMENT

Data management in archaeology serves three primary

functions: quality control of the information flow process, information storage and security, and information retrieval. Quality control contributes to the integrity of the lab and field operations by coordinating the information flow (contextual field data and laboratory analysis) and diseminating this informaiton with a high-level of confidence in its validity and reliability. Data management plays an important role in project decision making and operations, and ultimately serves as the final quality control check for producing acceptable information.

Information storage is the result of coordination of the information flow; data encoded in the field and lab are input into a computer file to be utilized during current operations or at a later date, or archived for posterity. A second copy of this information is secured on nine-track magnetic tape to serve as a backup in the event of inadvertent or purposeful destruction of the data file. Finally, the original paper records are preserved to provide both an auxillary backup and physical representation of the encoded computer data.

Retrieval of information, rather than serving as the culmination of the information flow process, is an integral and dynamic process which aids in detecting "how good" the information processing system is. Unacceptable and erroneous data, bugs in the software, and other problems are discovered by using data. Information retrieval may be in the form of daily tallies of artifact recovery or statistical analyses of complex problems. Retrievals can facilitate routine lab operations, produce statistical reports, or graphically depict artifact densities via interpolating artifact clusters on a contour map.

It is noteworthy to reiterate what is sometimes forgotten: that the computer is a tool, not an end in itself, used to make the information flow process more efficient and accurate than when done by more conventional methods.

Any consideration in designing an information processing system necessitates that a combination of traditional and innovative approaches to data management be utilized. As in any profession, data management cannot operate in a vacuum. Industry standards and techniques in data processing can be extrapolated to meet the requirements of this project and eliminate the possibility of "reinventing the wheel." Conversely, the development of innovative data processing techniques should reflect both the current "state of the art" in the data processing community and the specific needs of this project. A combination of both approaches can contribute to maximazation of computer resources, processing efficiency, decreased storage costs, and ultimately, a more responsive system better able to meet the demands of this project and subsequent archaeological studies.

What follows is a summary of the data management process, including descriptions of technical and software support, processing considerations, and information flow.

TECHNICAL SUPPORT

Data processing operations, including standard input/output operations, programming and debugging, file manipulation, and report production, are done on an AMDAHL V6-11 mainframe computer, originating at the Northeast Regional Data Center (NERDC) located at the University of Florida in Gainesville,

Florida. The AMDAHL V6-11 supports the Multiple Virtual System (MVS) and Job Entry Subsystems (JES/NJE) operating systems. Its main memory capicity of 8 megabytes make the largest and most efficient computing facility in the State of Florida. In addition, the AMDAHL V6-11 can use a variety of programming languages and programming packages, including the Statistical Package for the Social Sciences (SPSS), the Statistical Analysis System (SAS), and Synagraphic Mapping (SYMAP/SYMVU).

The project is connected to the mainframe at NERDC via telecommunications lines (a direct trunk line and a WATS line) from two remote terminals. An ADM 3A CRT terminal with an IDS 440 slave printer is the principle hardware configuration for communicating with the mainframe computer. An APPLE II microcomputer, when necessary can double as a CRT terminal.

The APPLE II microcomputer with support peripherals, including a Centronics 779 slave printer, a modem, and 5: floppy disk drives, is utilized as an intelligent terminal for data entry. Data are initially keypunched on the APPLE II and stored on floppy disks. This information is later transferred onto a master data file on the AMDAHL V6-11.

In addition to the terminal/printers located at the Fulton lab, an IBM 1403-N1 high speed line printer situated at the University of West Florida Computing facility is used to produce unusually lengthy reports. Eventually, a Gould 5100 Electrostatic Plotter, a tektronics Graphic Terminal and Plotter, and other graphics peripherals will be used to produce high resolution maps.

SOFTWARE SUPPORT

The present data management scheme is designed around the capabilities of three programming packages, SPSS, SAS, and SYMAP, to provide a variety of statistical, clerical, cartographic, and file handling capabilities. Additional software packages or custom programs may be employed when their design capabilities are more suited to a particular task.

SPSS (Statistical Package for the Social Sciences) is an integrative system of computer programs designed for social science data which provides a unified, simple, and flexible procedure for data transformation and statistical manipulation. The researcher is offered a large number of routines which provide statistical descriptions of data, such as frequency distributions, factor analyses, and multiple regressions. Each program "reads" from a single data file on disk, punch cards, or magnetic tape. SPSS programs can be modified with relative ease to include any number of statistical or clerical procedures.

SAS (Statistical Analysis System) is similar to SPSS with several exceptions. SAS is suited to statistical analysis on all types of data, not just social science data, and as such, offers a larger selection of statistical procedures and simple graphic representation of data. SAS can also work with more than one data file at a time, which makes it a more flexible program when compared to SPSS. Furthermore, SAS offers a report writing feature which allows the researcher to structure his own reporting formats.

SYMAP (Synagraphic Mapping) is a simple graphics package which plots distributions and densities of x and y coordinates

for visual representations, comparisons, and development of predictive models. Summary statistics can be printed below the completed map. SYMAP is unique in that a line printer, rather than an industrial plotter, can produce the desired output. A companion package, SYMVU can utilize the same SYMAP coordinates and produce three-dimensional images on a Gould Plotter.

In addition to performing retrieval via the above mentioned programs, several utility programs have been or will eventually be created to provide a variety of "secretarial" chores vital to maintaining a functional and efficient data processing system. These programs include a magnetic taping routine, an error-checking routine, an interactive batch conversion program, a reformating program, and a remote high-speed printer routine. These programs, generally small, written in JCL (Job Control Language), PL1 or BASIC, and single-purpose, are rarely used for tasks other than their intended function.

PROCESSING CONSIDERATIONS

Either time-sharing (TSO) or batch processing is used, depending on the nature of the job. The primary advantage of batch processing is that the operating system maximizes the efficiency of its resources, reducing cost at the expense of delayed turn-around. Conversely, time-sharing reduces turn-around time at the expense of minimizing the efficiency of the computer. A trade-off exist as to which expense is more costly: the user's time or the actual computer cost in dollars and cents.

INFORMATION FLOW

Upon completion of coding forms in both the field and lab,

paper records are transfered to data management to be keypunched. An initial cursory inspection of the forms is the first of several verification checks to detect information accuracy. Data from laboratory analysis are entered onto one set of floppy disks via the APPLE II microcomputer. Similarly, field data are keypunched onto a second set of floppy disks. Once a week, or as needed, this information is dumped from the floppy disks to an appropriate master data file on the AMDAHL V6-11. Each week, the updated data files are copied to magnetic tape to serve as a security backup.

While obvious errors are identified and corrected at a terminal session, erroneous data is passed along as the result of human error, and changes, deletions, and modifications in normal field and lab operations. Hence, detection and elimination of erroneous data is an important (and time-consuming) process of data management. Errors are detected in one of three ways: via an error-checking routine which locates only values outside an acceptable variable-value range, through a randomly selected 20 per cent sample in which each line of data is examined against the original paper records, and finally, through use of the data in retrieval situations.

Data for laboratory analysis are entered in a fixed format of 32 column lengths, readable to SPSS or SAD. Field data, however, are entered in a condensed format which requires the use of a specially tailored program to reformat the data in a fixed field. Finally, the two data sources (lab and field) are linked together only when a query session requires the integration of both types of information.

Output is produced from any of the three programs, SAS, SPSS, or SYMAP, depending on the nature of the query. Generally, requests are facilitated during the evening hours to take advantage of better turn-around in a TSO environment, or reduced costs in a batch environment. Immediate requests are fulfilled only when a lab or field director determines that operations in these areas may be impeded without immediate feedback (Figure 15).

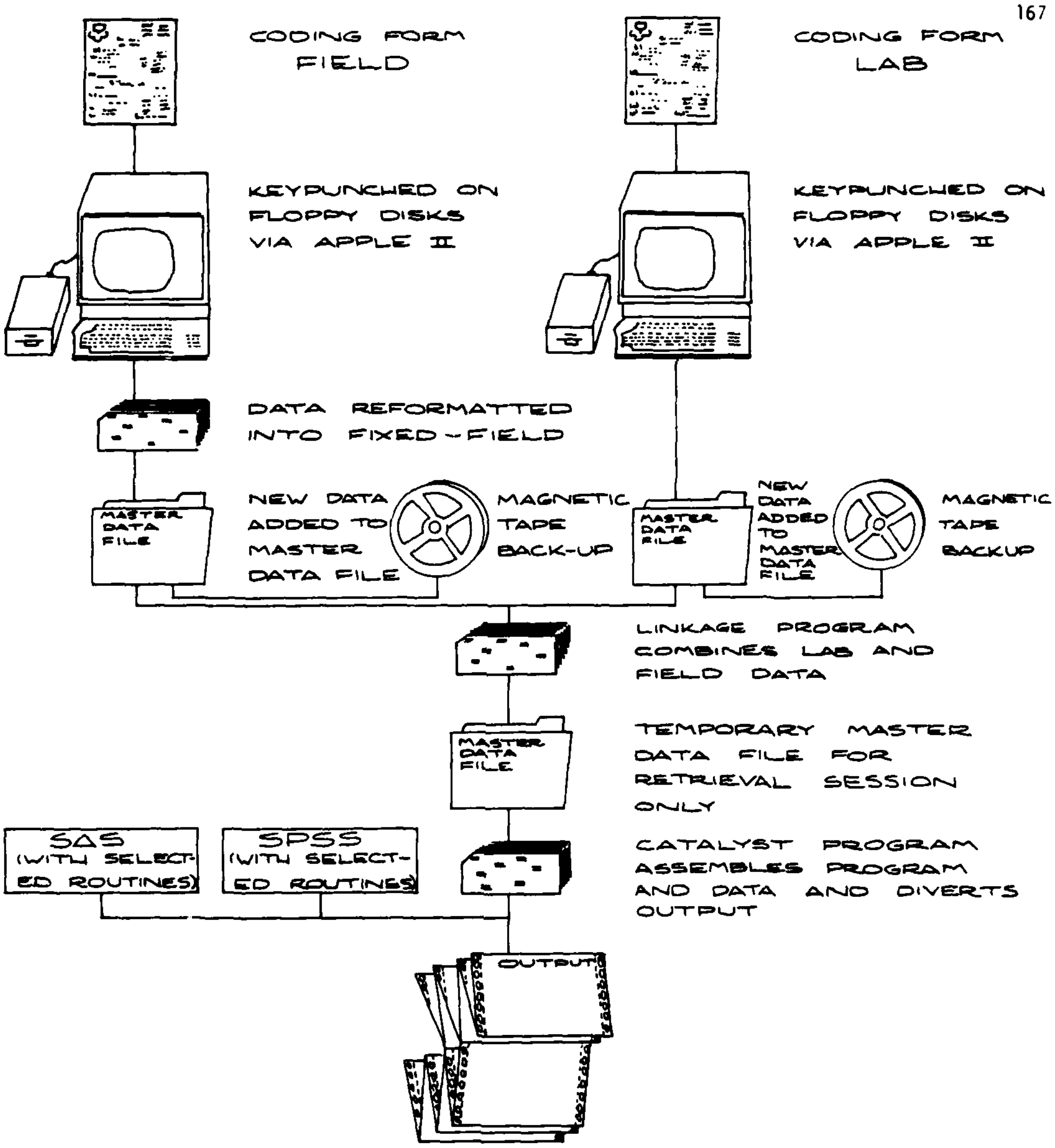


Figure 15. INFORMATION FLOW: Major Design Elements.

REFERENCES CITED

Ahler, Stanley A.

1975 Pattern and variety in extended coalescent lithic technology. Unpublished Ph.D. dissertation, Department of Anthropology, Univeristy of Missouri

1976 Mass analysis of flaking debris. Unpublished manuscript in author's possession.

Asch, Nancy B., Richard I. Ford, and David L. Asch

1972 Paleoethnobotany of the Koster site: the Archaic horizons. Illinois State Museum, Reports of Investigations 24.

Anderson, David G.

1979 Prehistoric selection for intentional thermal alteration: tests of a model employing Southeastern archaeological materials. Mid-Continental Journal of Archaeology 4:221-254.

Atkinson, James R.

1974 Test excavations at the Vaughn Mound (22L0538). In Archaeological survey and test excavations in the Upper Tombigbee River Valley: Aliceville-Columbus Lock and Dam and Impoundment areas, Alabama and Mississippi by Marc D. Rucker, pp. 115-164. Department of Anthropology, Mississippi State University.

1977 Cultural resources survey of selected construction areas in the Tennessee-Tombigbee Waterway: Alabama and Mississippi. Department of Anthropology, Mississippi State University.

1978 A preliminary report on excavations at the Kellogg site. Paper presented at the 35th annual meeting of the Southeastern Archaeological Conference, Knoxville.

Atkinson, James R. and Jack D. Elliot, Jr.

1978 A cultural resources survey of selected construction areas in the Tennessee-Tombigbee Waterway: Alabama and Mississippi. Department of Anthropology, Mississippi State University.

Bense, Judith A.

1979a Preliminary report: first priority group testing in the Tennessee-Tombigbee Waterway. U.S. Army Corps of Engineers, Mobile.

1979b Preliminary report: second priority group testing in the Tombigbee Waterway. U.S. Army Corps of Engineers, Mobile.

1979c Preliminary report: third priority group testing in the Tennessee-Tombigbee Waterway. U.S. Army Corps of Engineers, Mobile.

Bense, Judith A., Lynn M. Walker, and Donald W. Partlow, Jr.

1979 Archaeological investigations at site 22IT581, a multi-component satellite campsite in the Upper Tombigbee River Valley. University of Alabama, Office of Archaeological Research.

Blakeman, Crawford H.

1975 Archaeological investigations in the Upper Central Tombigbee Valley: 1974 season. Department of Anthropology, Mississippi State University.

1976 A cultural resource survey of the Aberdeen Lock and Dam and Canal Section areas of the Tennessee-Tombigbee Waterway: 1975. Department of Anthropology, Mississippi State University.

Bohannon, Charles H.

1972 _Excavations at the Pharr Mounds, Prentiss and Itawamba Counties, Mississippi and excavations at the Bear Creek site, Tishomingo County, Mississippi_. National Park Service, Washington.

Bowen, William R.

1979 The Late Archaic in the Upper Duck River Valley. _Tennessee Anthropologist_ 4:140-159.

Bradley, Bruce A.

1975 Lithic reduction sequences: a glossary and discussion. In _Lithic technology: making and using stone tools_, edited by Earl Swanson, pp. 5-14. Mouton, the Hague.

Brookes, Samuel O.

1979 The Hester site, an Early Archaic occupation in Monroe County, Mississippi: a preliminary report. _Mississippi Department of Archives and History, Archaeological Report_ 5.

Caldwell, Joseph R.

1958 Trend and tradition in the prehistory of the eastern United States. _American Anthropological Association, Memoir_ 88.

Collins, Michael B.

1975 Lithic technology as a means of processual inference. In _Lithic technology: making and using stone tools_, edited by Earl Swanson, pp. 15-34. Mouton, the Hague.

Cook, Thomas Genn

1976 Koster: an artifact analysis of two Archaic phases in west-central Illinois. _Northwestern University, Northwestern Archaeological Program, Prehistoric Records_ 1.

Cotter, John L. and John M. Corbett

1951 Archeology of the Bynum Mounds, Mississippi. _National Park Service, Archaeological Research Series_ 1.

Crabtree, Done E. and B. Robert Butler

1964 Notes on experiments in flint knapping: 1. heat treating of silica materials. _Tebiwa_ 7.

Curren, Cailup B., Jr.

1974 An ethnozoological analysis of the vertebrate remains, Little Bear Creek site (1CT°8). _Journal of Alabama_ Archaeology 20:127-182.

Dalton, George

1977 Aboriginal economics in stateless societies. In _Exchange systems in prehistory_, edited by T. K. Earle and J. E. Ericson: pp. 191-212. Academic Press, New York.

Deetz, James

1967 _Invitation to Archaeology_. The Natural History Press, Garden City.

DeJarnette, David L., John A. Walthall, and Steve B. Wimberly

1975a Archaeological investigations in the Buttahatchee River Valley II: excavations at Stucks bluff shelter. _Journal of Alabama Archaeology_ 21:99-119.

1975b Archaeological investigations in the Buttahatchee River Valley, Lamar County, Alabama. _Journal of Alabama Archaeology_ 21:1-37.

Dragoo, Don W.

1976 Some aspects of eastern North American Prehistory: a review 1975. _American Antiquity_ 41:3-27.

1976 Religion and social evolution in Formative Mesoamerica. In _The Early Mesoamerican village_, edited by Kent V. Flannery, pp. 345-368. Academic Press, New York.

Dye, David H.

1977 A model for Late Archaic subsistence systems in the western Middle Tennessee Valley during the Bluff Creek phase. _Tennessee Anthropologist_ 2:63-80.

1978 Middle and Late Archaic mortuary patterning in the Mid-South and Mid-West. Ms. on file, Office of Archaeological Contracts, University of West Florida.

1980 _Primary forest efficiency in the western Middle Tennessee Valley_. Unpublished Ph.D. Dissertation, Department of Anthropology, Washington University.

Ensor, H. Blaine

1980a An evaluation and synthesis of changing lithic technologies in the Central Tombigbee Valley. _Southeastern Archaeological Conference, Bulletin_ 22, in press.

1980b Classification and synthesis of the Gainesville Lake lithic materials: chronology, technology, and use. _University of Alabama, Office of Archaeological Research, Report of Investigation_ 13.

Fernald, Merrit L. and Alferd C. Kinsey

1943 _Edible wild plants of eastern North America_. Idlewild Press, Cornwall-on-Hudson, New York.

Flannery, Kent V.

1972 Archaeological systems theory and early Mesoamerica. In _Comtemporary archaeology: a guide to theory and contributions_, edited by Mark P. Leone, pp. 222-234. Southern Illinois Press, Carbondale.

Ford, James A.

1954 Comments on Spaulding's review of Ford. _American Antiquity_ 29:109-114.

Ford, James A. and Clarence H. Webb

1956 Poverty Point, a Late Archaic site in Louisiana. _American Musem of Natural History, Anthropological Papers_ 46:5-136.

Fowells, H. A.

1965 Silvics of forest trees of the United States. U.S. Department of Agriculture, Agriculture Handbook 271.

Futato, Eugene M.

1977a The Bellefonte site, 1JA300. Office of Archaeological Research University of Alabama, Research Series 2.

1977b Projectile point morphology, steps toward a formal account. Paper presented at the 34th annual meeting of the Southeastern Archaeological Conference, Lafayette.

1977c Cedar Creek Archaeological project, 1976 season, lithic analysis. MS. on file, Office of Archaeological Research, University of Alabama.

1980 Chipped stone biface manufacture in the Bear Creek watershed. Southeastern Archaeological Conference, Bulletin 22, in press.

Galm, Jerry R.

1978a Archaeological investigations at Wister Lake, LeFlore County, Oklahoma. University of Oklahoma, Archaeological Research and Management Center, Research Series 2.

1978b The archaeology of the Curtis Lake site (34LF5A), LeFlore County, Oklahoma. University of Oklahoma, Archaeological Research and Management Center, Research Series 3.

Galm, Jerry R. and Peggy Flynn

1978 The cultural sequences at the Scott (34LF-27) sites and prehistory of the Wister Valley. University of Oklahoma, Archaeological Research and Management Center, Research Series 3.

Goad, Sharon I.

1980 Patterns of Late Archaic exchange. Tennessee Anthropologist 5:1-16.

Gillespie, Susan D.

1977 The use of procedural modes to classify chipped stone tools. Unpublished M.A. thesis, Department of Anthropology, University of Alabama.

Gregg, Michael L. and Richard J. Grybush

1976 Thermally altered siliceous stone from prehistoric contexts: intentional versus unintentional alterations. American Antiquity 36:189-192.

Harris, Marvin

1975 Culture, people, nature: an introduction to general anthropology. Thomas Y. Corwell, New York.

Hempel, Carl G.

1962 Fundamentals of concept formation in empirical science. International Encyclopedia of Unified Sciences 2.

1966 Philosophy of natural science. Prentice-Hall, Inc., Englewood Cliffs.

Hooper, A. B., III.

1968 Pebble tools: Lively complex duplicated in Bear Creek watershed. Journal of Alabama Archaeology 14:1-16

House, John H. and James W. Smith

1975 Experiments in the replication of fire-cracked rock. In the Cache River Archaeological Project: an experiment in contract archaeology, assembled by Michael B. Schiffer and John H. House, Arkansas Archaeological Survey, Research Series 8:75-80/

Hubbert, Charles M.

1977 A cultural resourc survey of the Bay Springs segment of the Tennessee-Tombigbee Waterway. University of Alabama, Office of Archaeological Research, Report of Investigation 3.

Hudson, Charles

1976 The Southeastern Indians. University of Tennessee Press, Knoxville.

Jenkins, Ned J.

1979 Gainesville Lake ceramic description and chronology. Archaeological investigations in the Gainesville Lake of the Tennessee-Tombigbee Waterway 2. University of Alabama, Office of Archaeological Research, Report of Investigations 12.

Jennings, Jesse D.

1941 Chickasaw and earlies Indian cultures of northeast Mississippi. The Journal of Mississippi History 3:155-226.

1944 The Archaeological survey of the Natchez Trace. American Antiquity 9:408-414.

Jochim, Michael

1976 Hunter-gather subsistence and settlement: a predictive model. Academic Press, New York.

Johnson, Jay K.

n.d. Archaic biface manufacture: debitage analysis. MS. on file, Department of Sociology and Anthropology, University of Mississippi.

Josselyn, Daniel W.

1965 The Lively complex, discussion of some of the ABC's of this technology. MS. on file, Department of Anthropology, University of Alabama at Birmingham.

Klinger, Timothy C.

1978 Lowland environmental variability and prehistoric settlement behavior in the Lower Mississippi Valley. Midcontinental Journal of Archaeology 3 :295-311.

Krause, Richard A.

1978 Toward a formal account of Bantu ceramic manufacture. In Archaeological essays in honor of Irving B. Rouse, Edited by Robert C. Dunnell and Edwin F. Wall, pp. 87-120. Mouton, the Hague.

Krause, Richard A. and Robert M. Thorne

1971 Toward the theory of archaeological things. Plains Anthropologist.

Lafferty, Robert H. and Carlos Solis

1979 Phase II testing in the Bay Springs segment of the Tennessee-Tombigbee Waterway. Draft report submitted to Inter-Agency Archaeological Services, Atlanta.

Leacock, Eleanor

1978 Women's status egalitarian Society: implications for social evalution. Current Anthropology 19:247-275.

Lee, Richard

1968 What hunters do for a living, or, how to make out on scarce resources. In _Man the hunter_, edited by Richard Lee and Irven Devore, pp. 30-48. Aldine, Chicago.

Lewis, Sheila D. and James L. Caldwell

1972 Survey of the Tennessee-Tombigbee Waterway System, 1971-1972. Manuscript on file with the Mississippi Department of Archives and History, Jackson.

Losch, A.

1945 _The economics of location_. Yale University Press, New Haven.

Magennis, Ann L.

1977 _Middle and Late Archaic mortuary patterning: an example from the Western Tennessee Valley_. Unpublished M.A. thesis, Department of Anthropology, University of Tennessee.

Madeville, M. D.

1973 A consideration of the thermal pretreatment of chert. _Plains Anthropologist_ 18:177-202.

Marquardt, William H. and Patty Jo Watson

1976 Excavation and recovery of biological remains from two Archaic shell middens in western Kentucky. Paper presented at the 1976 meeting of the Southeastern Archaeological Conference, Tuscaloosa.

Marshall, Richard A. and John T. Glover

1974 Archaeological survey of Tishomingo State Park and environs, Tishomingo County, Mississippi. Department of Anthropology, Mississippi State University.

Morrison, J.P.E.

1942 Preliminary report on the Mollusks found in the shell mounds of the Pickwick Landing Basin in the Tennessee River Valley. In an archaeological survey of the Pickwick Basin in the adjacent portions of the states of Alabama, Mississippi and Tennessee, by William S. Webb and David L. DeJarnette, pp. 337-392. _Bureau of American Ethnology, Bulletin_ 129.

Muto, Guy R. and Joel Gunn

1980 A study of Late Quaternary environments and Early Man along the Tombigbee River, Alabama and Mississippi. Benham Blair and Affiliates, Inc., Oklahoma City.

Nielsen, Jerry J.

1971 Archaeological investigations of the Bear Creek Watershed. National Park Service.

O'Hear, John W. and Thomas L. Conn

1977 Archaeological salvage excavations at the L.A. Strickland I site (22TS765), Tishomingo County, Mississippi. Department of Anthropology, Mississippi State University.

Parmalee, Paul W. and Walter E. Klippel

1974 Freshwater mussels as a prehistoric food resource. American Antiquity 39:421-434.

Patch, Diana C.

1976 An analysis of the archaeological shell of freshwater Mollusks from the Carlston Annis shellmound, west central Kentucky. Unpublished Senior Honors thesis, Department of Anthropology, Washington University.

Penman, John T.

1977 Archaeological Survey in Mississippi, 1974-1975. Mississippi Department of Archives and History, Archaeological Report 2.

Plog, Fred and James N. Hill

1971 Explaining variability in the distribution of sites. In The distribution of prehistoric population aggregates, edited by George J. Gumerman. Prescott College Press, Prescott.

Purdy, Barbara A.

1975 Fractures for the archaeologist. In Lithic technology: making and using stone tools, edited by Early Swanson, pp. 133-141. Mouton, The Hague.

Rafferty, Janet E., B. Lea Baker, and Jack D. Elliott, Jr.

1980 Archaeological investigations at the East Aberdeen site (22MO819), Tombigbee milti-resource district, Alabama and Mississippi. Department of Anthropology, Mississippi State University.

Rappaport, Roy A.

1971 Ritual, sanctity, and cybernetics. American Anthropologist 73:59-76.

Rotstlund, Erhard

1952 Freshwater fish and fishing in native North America. University of California Publications in Geography 9.

Rouse, Irving

1960 The classification of artifacts in archaeology. American Antiquity 25:313-323.

Rucker, Marc D.

1974 Archaeological survey and test excavations in the Upper-Central Tombigbee River Valley: Aliceville-Columbus Lock and Dam and Impoundment areas, Alabama and Mississippi. Department of Anthropology, Mississippi State University.

Salmon, Merrilee H.

1978 What can systems theory do for archaeology? American Antiquity 43: 174-183.

Service, Elman R.

1966 The hunters. Prentice-Hall, Englewood Cliffs.

Smith, Bruce D.

1978 Prehistoric patterns of human behavior: a case study in the Mississippi Valley. Academic Press, Inc., New York.

Steward, Julian H.

1955 Theory of culture change: the methodology of multilinear evolution. University of Illinois Press, Urbana.

Stewart, Robert B.

1974 Identification and quantification of components in Salts Cave paleofeces, 1970-1972. In Archeology of the Mammoth Cave Area, edited by Patty Jo Watson pp. 41-47. Academic Press, New York.

Stowe, Noel R.

1970 Prehistoric cultural ecology in northwest Alabama. Unpublished M.A. thesis, Department of Anthropology, University of Alabama.

Swanton, John R.

1928 Religious beliefs and medical practices of the Creek Indians. Forty-second Annual Report of the Bureau of American Ethnology, 1928:473-672.

1946 The Indians of the Southeastern United States. Bureau of American Ethnology, Bulletin 137.

Thorne, Robert M.

1976 A cultural resource survey of the divide-cut section, Tennessee-Tombigbee Waterway, Tishomingo County, Mississippi: 1975. Department of Sociology and Anthropology, University of Mississippi.

Tylor E. B.

1871 Primitive culture: researches into the development of mythology, philosophy, religion, language, art, and custom. J. Murray, London.

Watson, Patty Jo

1969 The prehistory of salts Cave, Kentucky. Illinois State Museum, Reports of Investigations 16.

Watson, Patty Jo (Editor)

1974 Archaeology of the Mammoth Cave Area. Academic Press, New York.

Webb, Clarence H.

1968 The extent and content of Poverty Point culture. American Antiquity 33:297-321.

Webb, William S.

1939 An archaeological survey of Wheeler Basin on the Tennessee River in northern Alabama. Bureau of American Ethnology, Bulletin 122.

1974 Indian Knoll. University of Tennessee Press, Knoxville.

Webb, William S. and William G. Haag

1940 Cypress Creek villiages. University of Kentucky, Reports in Anthropology and Archaeology 4 (2).

Webb, William S. and David L. DeJarnette

1942 An archaeological survey of Pickwick Basin in the adjacent portions of the states of Alabama, Mississippi and Tennessee. Bureau of American Ethnology, Bulletin 129.

1948a The Flint River site, Ma 48. Alabama Museum of Natural History, Museum Paper 23.

1948b The Whitesburg Bridge site Ma 10. Alabama Museum of Natural History, Museum Paper 24.

1948c The Perry site Lu 25, Units 3 and 4 Lauderdale Co., Alabama. Alabama Museum of Natural Science, Museum Paper 25.

1948d Little Bear Creek site Ct°8, Colbert County, Alabama, Alabama Museum of Natural History, Museum Paper 26.

Winters, Howard D.

1968 Value systems and trade cycles of the Late Archaic in the Midwest. In New perspectives in archaeology, edited by Sally R. and Lewis R. Binford, pp. 175-221. Aldine, Chicago.

1969 The Riverton culture. Illinois State Museum, Reports of Investigations 13.

Wobst, H. Martin

1974 The archaeology of band society - some unanswered questions. Society for American Archaeology, Memoir 29.

Wolynec, Renata B.

1977 The systematic analysis of features from the Koster site, a stratified Archaic site. Ph.D. dissertation, North-western University, University Microfilms, Ann Arbor.

Yarnell, Richard A.

1974 Plant food and cultivation of the Salts Cavers. In Archaeology of the Mammotn Cave Area, edited by Patty Jo Watson, pp. 113-122. Academic Press, New York.

1976 Early plant husbandry in eastern North America. In Cultural change and continuity, edited by Charles E. Cleland, pp. 262-273. Academic Press, New York.

Zipf, George K.

1949 Human behavior and the principle of least effort. Addison-Wesley, Cambridge.

APPFNDIX A

TESTING INFORMATION FROM THE SIX SITES TO BE INVISTIGATED

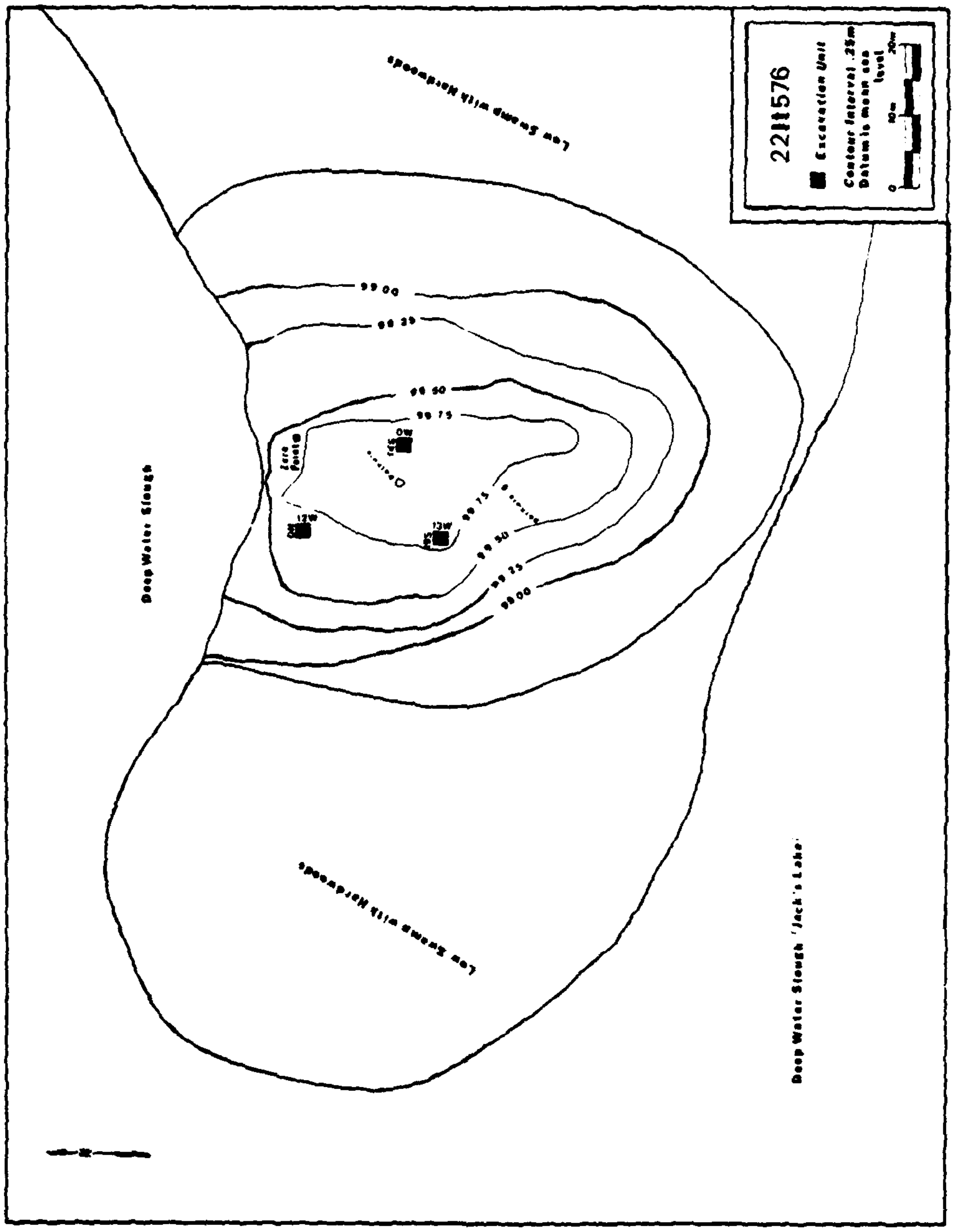
This information has been synthesized from Bense (1979a,b,c)

Site 22IT576 (Dorsey Moore Site)

Site 22IT576 is located approximately 1.6 km north of Fulton, Mississippi in the active floodplain of the Upper Tombigbee Valley. The site (Map 2) is a midden mound approximately 50 x 40 m in size and 1.5 m high. Three 2 by 2 m units were hand excavated in the deepest portions of the site. The test units were not dug to sterile soil because of high water conditions. Cultural deposits indicated continuous occupation from the Late Paleo-Indian period through the Middle Woodland period. The thickest deposits were associated with the Gulf Formational and the Archaic occupations.

The Woodland components (Miller II-III) are contained in the plow zone. These components were defined primarily by ceramic types, including Furrs Cord Marked, Baytown Plain, Saltillo Fabric Marked, Mulberry Creek Cord Marked and Mulberry Creek Plain. Alexander series ceramics were consistently mixed with the Woodland assemblage. The projectile point/knives associated with the ceramics were the Adena and Flint Creek types. The stone tool assemblage was composed of projectile point/knives (17%), bifaces (34%), small chipped stone tools (20%), large tools (7%), and utilized flakes (10%). No cultural features were associated with the Woodland occupations. The eastern portion of the site appeared to have contained cultural deposits from the Gulf Formational occupation.

The Gulf Formational occupation of the site 22IT576 was contained between approximately 20 and 80 cm below the surface, but concentrated between 30 and 50 cm below surface. This occupation was identified by the Wheeler and Alexander ceramic series. The



Map 2. Map of Site 22It576

southwestern portion of the site contained Wheeler Ceramics below those found on other site areas. In the southeastern portion of the site, some mixing of the Gulf Formational and Archaic occupations is indicated. The Alexander and Wheeler series occured together in all units. The projectile point/knife types associated with the Gulf Formation occupation were Flint Creek, Mud Creek, stemmed, shouldered, notched, Pickwick, and Benton. The stone toll assemblage of the Gulf Formational occupation was composed of projectile point/knives (36%), bifaces (21%), small chipped stone tools (23%), large tool (8%), and utilized flakes (11%). One refuse pit containing two Wheeler Plain sherds, two sand tempered sherds, and three flakes could possibly be associated with the occupation. One human burial represented by teeth caps and one burned clay area, in separate test units, were associated with the occupation.

The Archaic deposits at Site 22IT576 were up to 110 cm thick on the western portion of the site but only 50 cm thick in the southeastern area. The late portion of the Archaic Stage (4,000 - 2,000 B.C.) appears to be best represented by site 22IT576. This is suggested by the projectile point/knives of the assemblage: Benton, Flint Creek, Buzzard Roost Creek, and a stemmed and shouldered style. The stone tool assemblage consisted of projectile point/knives (33%), bifaces (40%), small chipped stone tools (17%), and large tools (12%). One dog burial was associated with this occupation.

The Late Paleo-Indian occupation was encountered only in one unit (14S OW) in the 130-140 cm level. This was identified by

the recovery of a Quad projectile point associated with twenty-five flakes, four pieces of lithic debitage and one piece of smoothed siltstone. No features were associated with this occupation. The extent of this occupation was not determined due to high water conditions.

In sum, the cultural deposits at Site 22IT576 indicate occupation from the Late Paleo-Indian period through the Woodland Stage. Testing indicated an uneven distribution of these deposits as schematically depicted in Figure 16.

The stratigraphy observed at Site 22IT576 was dominated by brown-black organically stained sand. Charcoal was abundant. Subtle differentiation within the dark cultural stratum was observed. This consisted of black and dark brown zones 20-40 cm thick. The black zone was underlain by a dark brown band. This series was repeated twice. From the information gathered during testing, associations of these zones with cultural components could not be made.

Site 22IT539 (Walnut Mound)

Site 22IT539 is a midden mound located in the active floodplain of the Upper Tombigbee Valley approximately 10.6 km north of Fulton, Mississippi. The site is circular in shape and 80 m in diameter (Map 3). Cultural deposits in the center of this midden mound were up to 2.25 m thick.

Testing consisted of hand excavating three 2 by 2 m units and four backhoe trenches. Most areas of the site were investigated. Of the three hand units, only one (30S 18W) encountered deep deposits. The northern excavation unit was

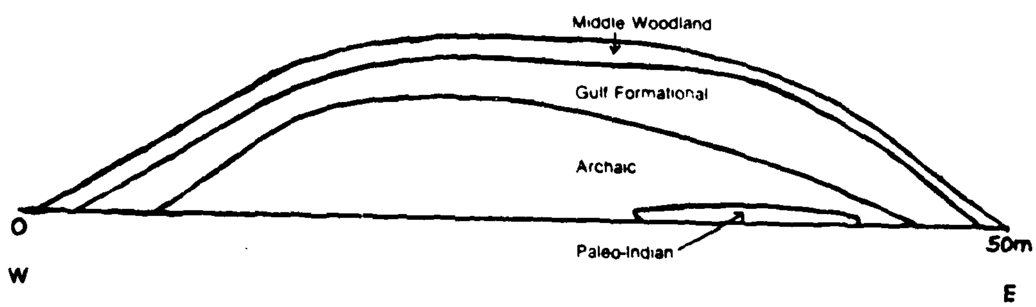
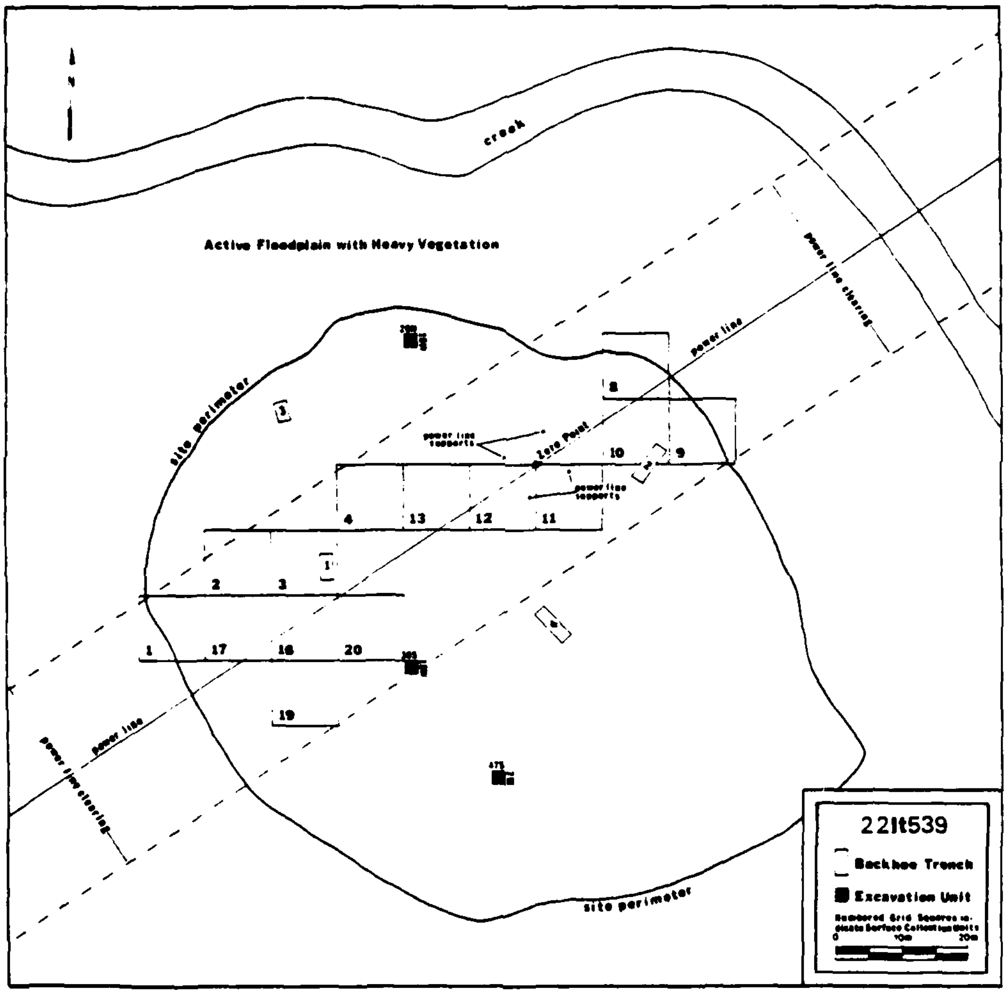


Figure 16. Schematic profile of Site 22It576



Map 3. Map of Site 22IT539

apparently on the edge of the site and cultural material extended 90 cm below the surface. The southern unit was determined to be disturbed due to amateur digging. The center unit was not excavated to sterile soil due to the high water table. This unit, however, was the most informative (Map 3).

The cultural occupations of Site 22IT539 were Lat Archaic and Late Woodland. Based on data from the unit in the center of the site, the Late Archaic deposit is up to 110 cm thick. This occupation was identified by the following projectile point/knife styles: Pickwick, Benton, Buzzard Roost Creek, and Little Bear Creek. The stone tool assemblage associated with this substantial deposit contained projectile point/knives (42%), large tools (13%), and utilized flakes (12%). An abundance of scrapers (N=43) and lack of biface tools were observed. The Late Archaic deposit in the northern unit was only 10 cm thick and could not be well isolated. Two fired clay areas were associated with the Late Archaic occupations at Site 22IT539. The dimensions and shape of these features could not be discerned due to partial exposure in the test units.

The late Woodland and Mississippian occupations of Site 22IT539 appeared to be on the northern portion of the site. Here, these deposits were up to 80 cm thick. In the other areas of the site, the cultural material identifying the late Woodland and Mississippian occupations was present only in the plow zone. The ceramic assemblage consisted of Mississippi Plain and Insised, Baytown Plain, Mulberry Creek Cork Marked, Withers Fabric Marked, Furrs Cord Marked, and Baldwin Plain. The stone tool assemblage consisted of projectile points (32%), bifaces

(3%), small chipped stone tools (29%), large tools (18%), and utilized flakes (19%). A projectile point style could be identified from this occupation (Hamilton). This assemblage contained a relatively high number of scrapers and projectile point/knives and a lack of other bifaces. No features were associated with this occupation.

The primary occupation at Site 22IT539 was represented by Benton deposits in the central portion of the site (up to 100 cm) with associated fired clay areas. The assemblages of the occupations appear to be similar in the relative numbers of scrapers and projectile point/knives. The Late Woodland assemblage did contain several mullers (N=13). The lack of Gulf Formational occupations at Site 22IT539 is unique to the tested midden mounds in the Upper Tombigbee Valley.

A projected distribution of the deposits is graphically presented in Figure 17.

Site 22IT590

Site 22IT590 is located approximately 11.6 km north of Fulton, Mississippi on the left side of Mackeys Creek Valley. The site lies at the bottom of the steep valley wall in the active floodplain. Site 22IT590 is a midden mound which was once approximately 150 in diameter. Post-depositional disturbance has truncated the site so that a 70 by 90 area remains (Map 4). Cultural material was encountered to depths of 190 cm below surface. Testing procedures at this site included hand excavation of 2 by 2 m units, three 1 by 1 m units, shovel testing, and exposure and oetailed drawing of a 60 m profile through the center of the site.

Cultural material recovered during testing indicated that this site has been utilized from the transitional Pale-Indian through the Middle Woodland periods. Due to the severe post-depositional distrubance, the horizontal distribution of the Late Paleo-Indian and Early Archaic occupations could not be

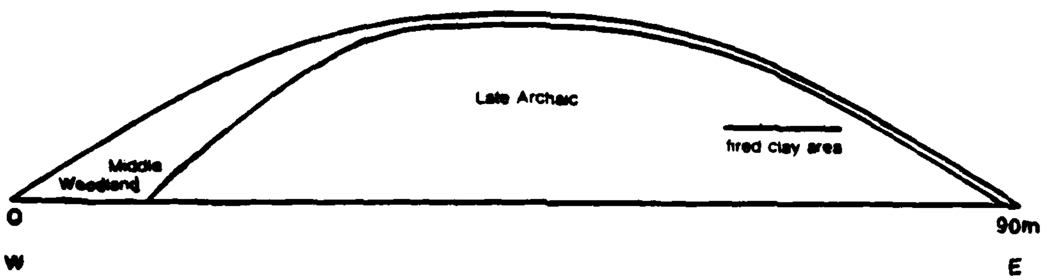
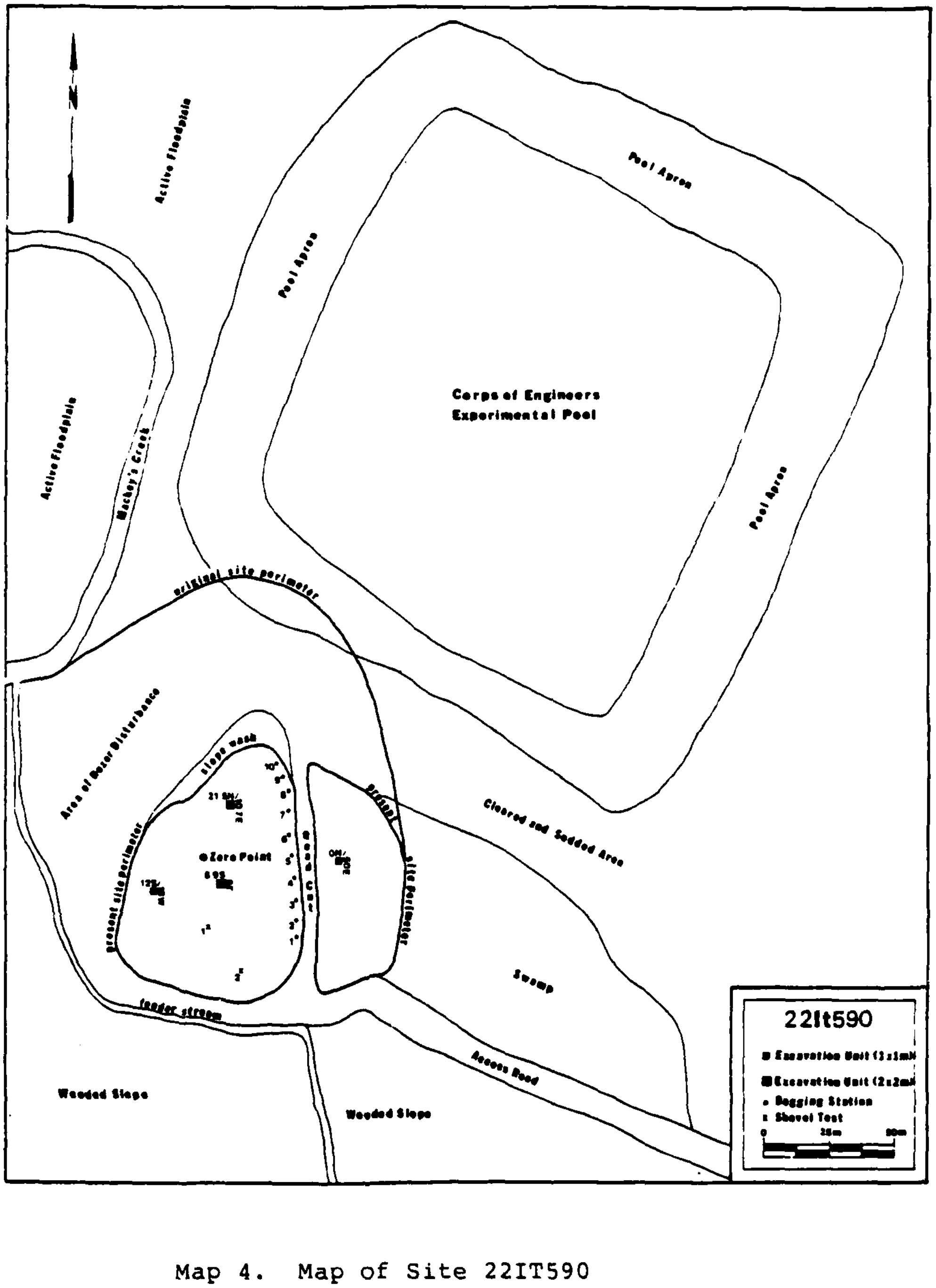


Figure 17. Schematic profile of Site 22It539



Map 4. Map of Site 22IT590

determined. These occupations were identified by the Greenbrier and Kirk Corner Notched projectile points collected in the disturbed western area of the site.

The Middle and Late Archaic occupation at Site 22IT590 was encountered in deposits up to 130 cm thick. The Middle Archaic was indicated by one Eva projectile point/knife in apparent stratigraphic position below Late Archaic stylistic indicators such as Benton, Flint Creek, and Pickwick. The stone tool assemblage of the Archaic occupation was characterized by projectile point/knives (35%), bifaces (10%), small chipped stone tools (10%), large stone tools (33%), and utilized flakes (12%). The most common tool types other than projectile point/knives were cores, bifaces, and preforms. Two refuse pits were associated with an Archaic occupation, one of which contained a concentration of deer vertebrae.

The Gulf Formational occupation at Site 22IT590 is up to 50 cm thick and contains a stratified ceramic sequence. An initial Wheeler occupation is followed by mixed Wheeler-Alexander which is followed by an Alexander occupation. The upper 20 cm (plowzone) is mixed, and contains limestone tempered ceramics, grog tempered ceramics, and sand tempered ceramics. Mixture of the Middle Woodland and Late Gulf Formational artifactual material by cultivation is suggested. The stone tool assemblage associated with the Gulf Formational occupation is composed of projectile point/knives (9%), bifaces (19%), small chipped stone tools (9%), large stone tools (3%), and utilized flakes (57%). The large proportion of utilized flakes could be due to cultivation. The most common tools types in this assemblage

(excluding utilized flakes) were bifaces, scrapers, and cores.

The cultural remains at Site 22IT590 indicate a deep Archaic deposit (up to 110 cm) preceded by a possible transitional Paleo-Indian occupation of unknow extent. The Gulf Formational occupation is up to 50 cm thich and well stratified. The lithic assemblage suggests that the entire reduction sequence is present at this site: cores, preforms, bifaces, and finished tools, Features are present and detectable within the Archaic and Gulf Formational occupations. The northern portion of the site, where cultural deposits are deepest, appears to be the most informative area of the site. A schematic diagram of the site is presented in Figure 18.

Site 22MO710

Site 22MO710 is a midden mound located 3.4 km southeast of Amory, Mississippi, on the edge of the Holocene terrace. The site measures 40 by 20 m with cultural deposits up to 70 cm deep (Map 5). Testing consisted of three hand excavation units, shovel tests, and a controlled surface collection.

Testing indicated that this site has been utilized from the Late Paleo-Indian period throgh the Mississippian Stage. A late transitional Paleo-Indian occupation could be represented at the site due to the presence of a Greenbrier projectile point 60-70 cm below the surface. Only a few flakes (23) and lithic debitage (4) were associated in this level.

The Archaic occupation is fully represented (Early, Middle, and Late). An Early Archaic occupation is suggested by the presence of a Plevna projectile point/knife between 50 and 60 cm below the surface. Middle Archaic deposits appear to be

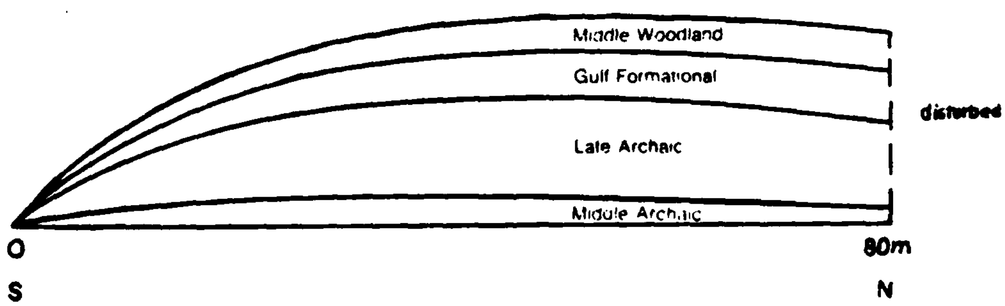
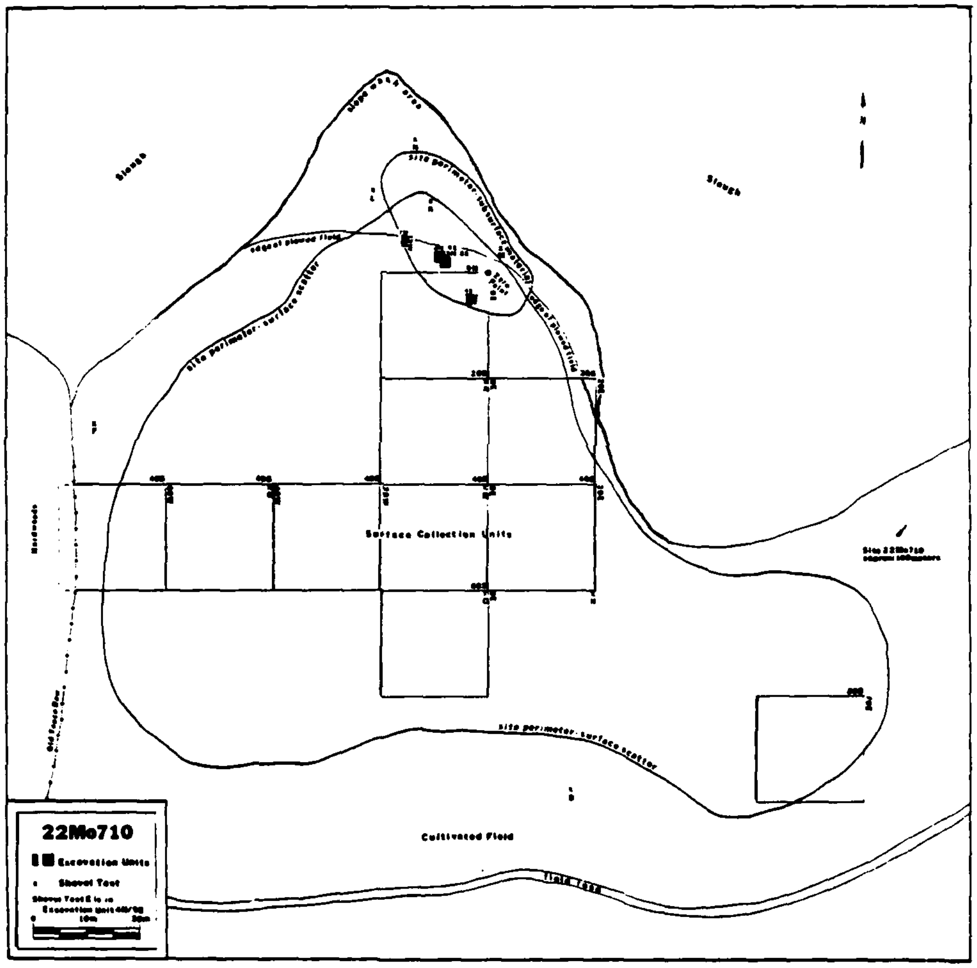


Figure 18. Schematic profile of Site 22It590



Map 5. Map of Site 22MO 710

isolated. The Late Archaic period was not encountered in excavations during testing, however, the surface collection produced one Wade and one Little Bear Creek projectile point/knife indicative of this period. However, these styles are also associated with the Gulf Formational occupation in this area. The depth of the Archaic occupation at Site 22MO710 was difficult to determine due to a pit and burial from later occupations which intruded into this zone in the excavation units. The Archaic deposits appear to extend from 30 to 70 cm below the surface in the western area of the site. The tool assemblage of the Archaic occupation consisted of projectile point/knives (12%), bifaces (2%), and utilized flakes (73%). No features were found associated with the Archaic deposits.

The Gulf Formational occupation was mixed with the later Middle and Late Woodland and Mississippian occupations. These deposits extended to only 30 cm and cultivation had disturbed the integrity of the cultural remains. However, two refuse pits could be associated with the Gulf Formational occupation based on the ceramics contained within them. In addition, one burial probably associated with the Late Woodland occupation was encountered during testing. This burial was originally thought to be associated with the Gulf Formational, however, re-analysis suggests it is Late Woodland. No grave goods were associated with this burial and the cultural association is poorly defined.

Testing of Site 22MO710 indicated that this locality had been occupied at least intermittently for 8,000 years. The Archaic and perhaps Late Paleo-Indian deposits appear to be best preserved. The remains of the Gulf Formational, Woodland, and

Mississippian occupations seem to be disturbed; however, some intact features remain. A schematic diagram of the deposits is presented in Figure 19.

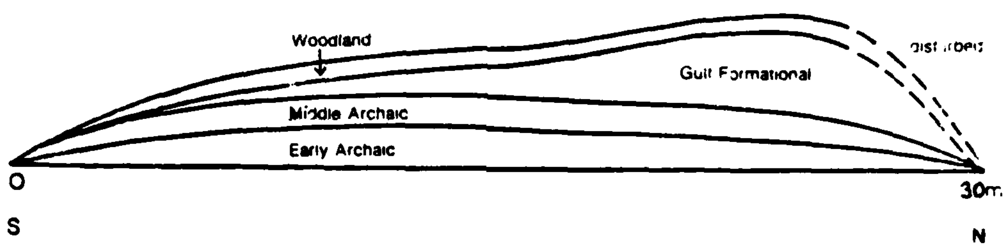


Figure 19. Schematic profile of Site 22Mo710

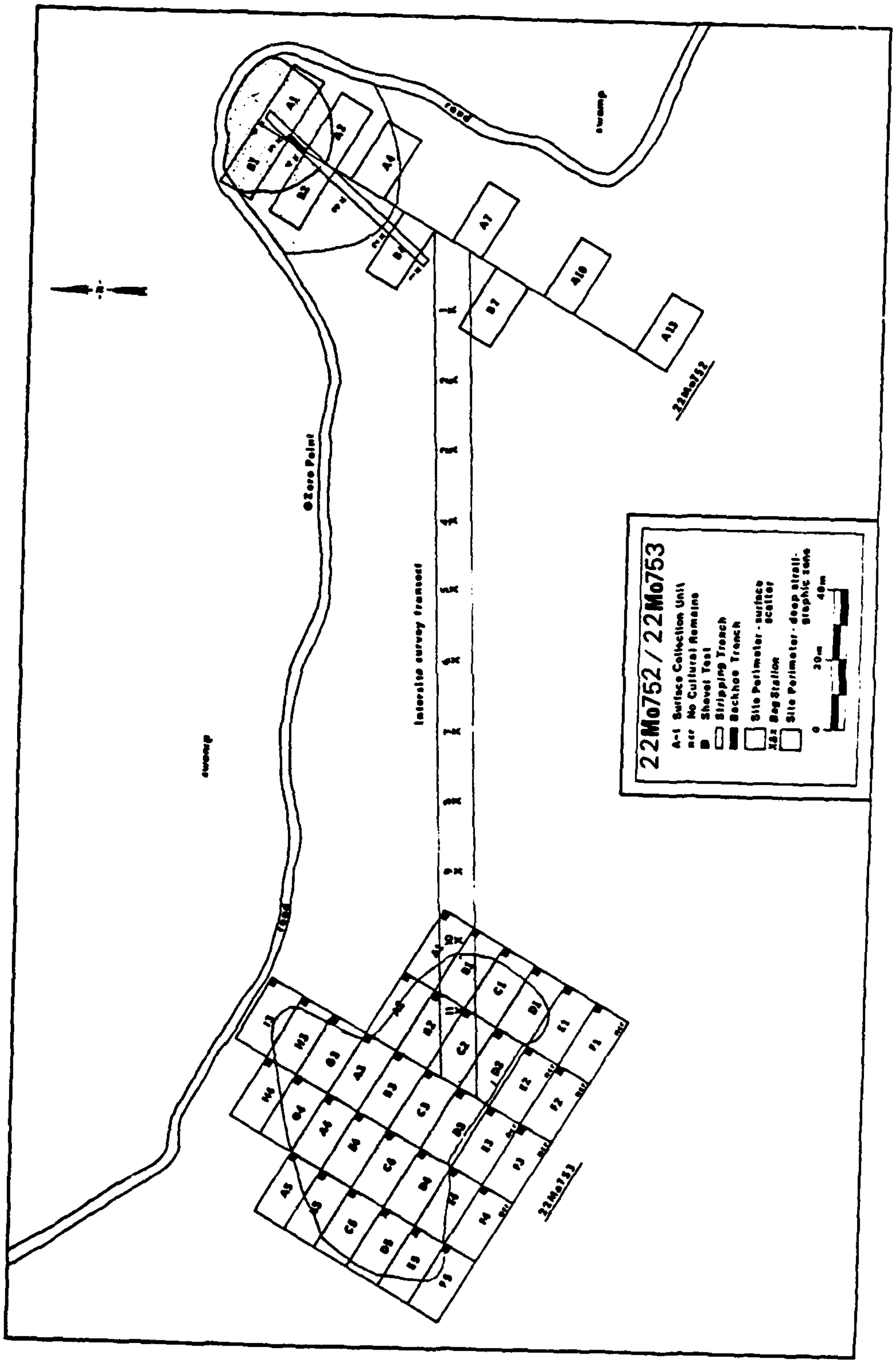
Site 22MO752

Site 22MO752 is a midden mound on the edge of the Holocene terrace approximately 3.2 km north of Aberdeen, Mississippi (Map 6). The site is 25 to 30 m in diameter and up to 150 cm deep. Testing of this site consisted of a controlled surface collection, a bulldozer trence, and a backhoe trence. This was the first midden mound tested in the testing program and the procedures were not fully developed. As a consequence, hand excavation was not conducted.

Due to the lack of vertical controls, knowledge of the cultural deposits at this site is minimal. There was sufficient control in the stripping trench to determine that the occupation of this site spanned the Late Archaic through Late Woodland.

The Woodland and Gulf Formational deposits appear to be contained in the upper 40 cm of the site. Cultivation has mixed these components and spread them over a 75 m^2 area. Unfortunately the nature of the assemblages cannot be indicated at this time.

Less is known of the Archaic deposits at Site 22MO752. This occupation zone is up to 110 cm deep in the center of the site. This is based on the lack of ceramics from 40 cm below the surface. The surface collection revealed Late Archaic projectile point/knife styles: Wate (N=5) and Little Bear Creek (N=2). The Archaic occupation can be only cursorily evaluated. The backhoe trench in the center of the site revealed a dark organic zone approximately 15 cm thick and an area of diffuse fired clay lumps which can be associated with the Archaic occupation.



Map 6. Map of Site 22M0 752

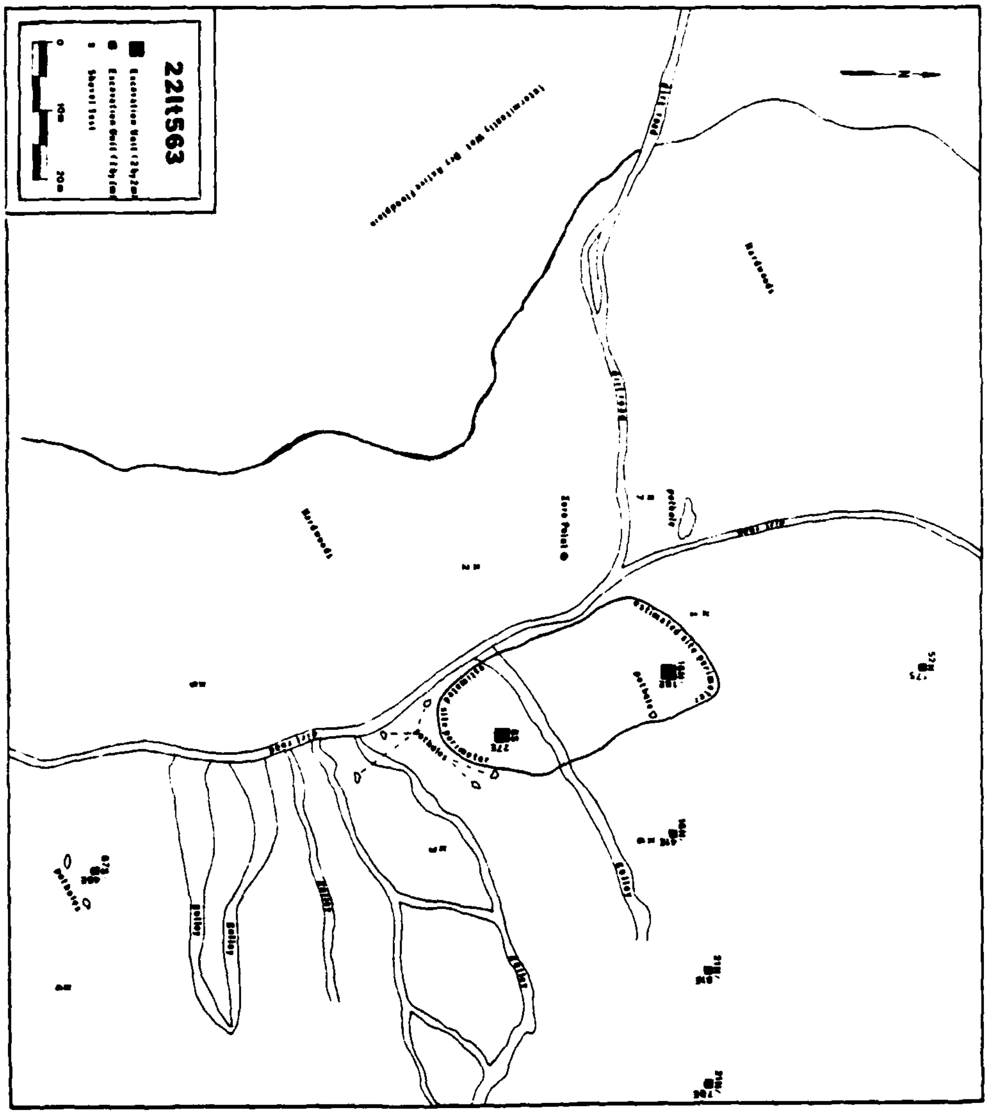
Site 22IT563 (Beaver Lake Site)

The Beaver Lake Site is located approximately 14.5 km north of Fulton, Mississippi in the active floodplain at the base of the valley wall. The site is not a midden mound. It is 20 by 40 m across and up to 70 cm thick (Map 7). Testing consisted of two 2 x 2 m units, five 1 by 1 m units and seven shovel tests.

Testing revealed that this site contains a single component (Alexander), the remains of which are sealed in a 50-70 cm thick stratum. Slope wash has buried the cultural material up to 20 cm deep. The assemblage of this Alexander occupation will be important in establishing a baseline for this culture in the UTV. The ceramics (N=337) consisted of:

Alexander Pinched	49%
O'Neal Plain	42%
Alexander Incised	4%
Alexander Punctate	4%
Alexander Pinched/Incised	4%
Smithsonia Zone Punctated	1%

The lithic assemblage consisted of 58 stone tools and 72 flakes. The projectile points associated with the diagnostic ceramics



Map 7. Map of Site 22IT563

were Flint Creek (N=6), Little Bear Creek (N=1) and Bakers Creek (N=1). The entire stone tool assemblage was comprised of: projectivel point/knives (22%), bifaces (12%), small chipped stone tools (31%), large stone tools (10%), and utilized flakes (19%). Two features were associated with the Alexander occupation at Site 22IT563. One feature appeared to be a refuse pile or midden concentration. It consisted of fragments of several vessels, stone tools, flakes, and organic remains. The second feature was a small pit, 30 cm in diameter, which contained charcoal stains and two flakes.

Testing of the Beaver Lake Site indicated a single component Alexander occupation. The small size of the site and presence of features will allow a close inspection of one segment of the Alexander occupation in the Upper Tombigbee Valley.

<u>Summary of the Testing Information</u>

The information presented above from the six midden mounds aids in determining the nature of the archaeological record to be encountered in this project.

There are certain commen ties between the midden mounds, as well as individual differences. The strongest common threads form a polythetic set of factors. They are:

1. Initial occupation during the Late Paleo-Indian or Early period.
2. Deep Middle and Late Archaic deposits.
3. Occupational features:

   fired clay areas.

   refuse/storage pits.

4. Organic remains:

   charred wood.

   nuts.

   bone.

5. Similar Stratigraphy:

   black organic deposits.

   zonation of black and brown strata.

6. Differential distribution of components.

7. Gulf Formational and Woodland deposits usually mixed, except at Site 22IT590.

The individual differences observed between the midden mounds were:

1. Different tools assemblages:

   22IT539 - many scrapers and mullers; no bifaces or cores.

   22IT576 - many drills, projectile points; no bifaces or cores.

   22IT59 - many cores, preforms, bifaces and few small chipped stone tools; good Gulf Formational stratigraphy.

   22MO710 - sparse assemblage; finished tools.

   22MO752 - little information available, but occupied later than other sites (Late Woodland and Mississippian).

2. Different physiographic locations:

   In active floodplain - 22IT539, 22IT576, 22IT590, 22IT565, 22IT581.

   On Holecene terrace - 22MO710, 22MO752.

3. Different cultural features:

   Burned clay areas - 22IT539.

Refuse Pits - 22IT590, 22IT576, 22MO710.

Dark organic bands - 22MO752.

The similarities and differences between the midden mounds present several concrete avenues of investigation. However, it is clear that the central portion of the midden mounds (inner two thirds) contains the thickest deposits and the most cultural features. The outer one third of the mounds contains thin and often mixed cultural deposits. The added depth of the central portions of the sites gives protection through burial of the earlier deposits.

APPENDIX B

ORGANIZATION CHART

	Lab Director	Assistant Lab Director	2 Team Leaders	10 Crew Members
	Lab Director	Assistant Lab Director	2 Team Leaders	10 Crew Members
	Field Director	Assistant Field Director	4 Team Leaders	12 Crew Members
Principal Investigator	Field Director	Assistant Field Director	4 Team Leaders	12 Crew Members
	Research Associate	Computer Assistant	1 Team Leader	4 Crew Members
Totals	5 directors	5 assistants	13 team leaders	48 Crew Members

Project Organization Chart

APPENDIX C

SCHEDULE

The schedule for Phase I is presented in this appendix and includes all activities described in the body of the research design plus data recovery and laboratory analysis.

The schedule for Phase I is based primarily on excavation rates. The laboratory schedule is based on and will coincide with the field schedule. Acitivities which are non-volumetric in nature (field headquarters preparation, equipment assembly, the seminar, and site preparation) will be considered in designing the schedule.

It will be necessary to stagger the beginning of excavation for the first two sites. In order to maintain consistency for all activities, supervisory personnel will be present from the beginning of the Intensive Seminar (work week three) through at least four weeks of intensive data recovery at the first site (work week 12). During this time, the supervisors will become familiar with all work procedures, forms, coding procedures, and feedback operations used during Phase I. At the beginning of work week 13, the supervisors will go to their respective sites and excavation will begin at the second site with new crew members. The end of Phase I will also be staggered due to the uneven completion of data recovery from specific sites.

The proposed analytical procedures and data management system for Phase I are designed to provide maximum information for the field and laboratory directors. Feedback sessions will be scheduled during the course of data recovery on a daily, thirdly, and summarily basis.

The average excavation rate maintained during data recovery will be 0.75 m^3 per man-day for a stafff of 18 field people.

Twelve persons will be actually excavating: three general excavation teams each composed of four persons. The field director, assistant director, and special waterscreen team will not excavate, but will handle and direct the flow of the excavated material. Therefore, the average expected volume of excavation for a single field team will be 9 m^3 per day. This figure will be used for calculating data recovery time periods for each site.

The specific size of the excavation units can be estimated at this time. As discussed in the strategy section of the research design, several variables will determine the placement and size of the excavation units. These include the testing information, chemical anomalies, expected feature size, and ethnoarchaeological data. These variables will determine the specific coordinates of the units. On the midden mound sites the large excavation units probably will be placed in the inner two thirds of the site, because this is the most informative area (Bense 1979a,b,c; Galm 1978a,b,c) of the site due to :

a) thicker cultural deposits.

b) increased probability of cultural features.

c) prserved earlier deposits.

d) less erosion.

Smaller units will be placed in other areas of the site to investigate intra-site patterning and activities. These smaller units will be approximately 4 by 4 m to provide a plan view of features and sufficient profile length for interpretation. At this time, one cross-checking unit in each quadrant of the site is anticipated.

Based on the maximum size of the large excavation and

smaller test units, we propose the maximum number of cubic meters to be excavated. This volume can be expressed as a percent of site volume. The schedule below is a product of this projected volume, production rate, and necessary non-excavation activities (mapping, feature drawing, profile drawing, and site mobilization and demobilzation.) Site volume calculations were computed from testing data and will be refined during the coring and excavation procedures. The samples are not equal from each site due to differing site volumes, disturbance, time availability, and funding.

While we realize that scheduling is an important aspect of contract archaeology, there are other factors which are specific to the discipline. They are related to the uncertainty of excavation. We cannot predict precisely what we will encounter, nor the length of time needed to extract the necessary information. If unexpected data are encountered, the contracting agency and the project staff will determine if the contract should be modified.

Site 22IT576

Small excavation unit volume-		
four 4 by 4 by 2 m units	= $128m^3$	
Large excavation unit volume-		
one 20 x 20 x 2 (?) unit	= $800m^3$	
Total sample volume	$928m^3$	
Excavation work weeks		= 21
Non-excavation work weeks		= 7
Total work weeks		28

Site 22IT539

Small excavation unit volume- four 4 by 4 by 3.5m units	$= 204.8m^3$	
Large excavation unit volume-	$= \underline{686.0m^3}$	
Total sample volume	$890.8m^3$	
Excavation work weeks		= 20
Non-excavation work weeks		= 7
Total work weeks		27

Site 22IT563

Site 22IT563, a shallow (less than 1 m) small (20 by 40), single component Alexander site, differs from the other sites and consequently, the field and laboratory procedures described above will be altered somewhat. The theoretical basis, organization, and goals previously explained will be used here.

The proposed procedures for data recovery and preliminary analysis will emphasize the isolation and association of activity areas. Particular care will be taken to document specimen position and associations. This site is one of two known single component Alexander sites (Dye 1980) and efforts will be made to retrieve the maximum amount of information possible. One of the primary advantages of a single component site is that non-diagnostic specimens, technological attributes, and features can be directly associated with a known occupation. In order to maximize this unique capability, approximately one-third of the site will be excavated. Features and artifact concentrations will be carefully documented. Six working weeks are allowed for non-excavation procedures. In this instance hand excavation and detailed documentation of cultural phenomena is expected to be

high and the volumetric production is conversely expected to be low.

Large excavation unit volume	= 160m^3	
Small excavation unit volume	= 25m^3	
Total sample volume	185m^3	
Excavation work weeks		= 12
Non-excavation work weeks		= 6
Total work weeks		18

Site 22IT590

Large excavation unit volume	= 300m^3	
Small excavation unit volume	= 160m^3	
Total sample volume	460m^3	
Excavation work weeks		= 11
Non-excavation work weeks		= 5
Total work weeks		16

Site 22MO710

Large excavation unit volume	= 300m^3	
Small excavation unit volume	= 24m^3	
Total sample volume	324m^3	
Excavation work weeks		= 4
Non-excavation work weeks		= 2
Total work weeks		6

Site 22MO752

Large excavation unit volume	= $283m^3$	
Small excavation unit volume	= $32m^3$	
Total sample volume	$315m^3$	
Excavation work weeks		= 7
Non-excavation work weeks		= 3
Total work weeks		10

Site	Total Site Volume m^3	Volume to be excavated m^3	Per cent of site volume	Excavation work weeks	Non-excavation work weeks	Total work weeks
22IT576	5,250	928	17.7	21	7	28
22IT539	11,308	890	7.9	20	7	27
22IT563	506	185	33.0	12	6	18
22IT590	9,450	460	4.9	11	5	16
22MO710	270	160	59.3	4	2	6
22MO752	1,060	315	29.7	7	3	10
Testing	-	-	-	8	-	8

Time and Task Estimates: Evaluative Investigation

Performance of full testing procudures by a field crew of 8 to 10 persons.

Laboratory time is expected to be the same length as field work, however, the crew size will be larger (14-16 persons) to compensate for the volume of data produced during surface collections.

22MO591		4 weeks
22MO675		2 weeks
22MO772		2 weeks
	Total testing time	8 weeks

Site Specific Schedule

Site 22IT576 Schedule

Work Week	Calendar Date	Activity
6	Feb. 11-15, 1980	Establish field operations
7	Feb. 18-22, 1980	Coring and interpretation
8-15	Feb. 25-Apr, 1980	Intensive data recovery
16.1-.2	April 21-22, 1980	First feedback session
16-24	April 21-June 20, 1980	Intensive data recovery
25.1-.2	June 23-24, 1980	Second feedback session
25-33	June 23-Aug 22, 1980	Intensive data recovery
34	Aug. 25-29, 1980	Summary feedback session and site demobilization

Site 22IT539 Schedule

Work Week	Calendar Date	Activity
10	March 10-14, 1980	Establish field operations
11	March 17-21, 1980	Coring and interpretation
12-18	March 24-May 1, 1980	Intensive data recovery
19.1-.2	May 11-12, 1980	First feedback session
19-27	May 11-July 11, 1980	Intensive data recovery
28.1-.2	July 14-15, 1980	Second feedback session
28-36	July 14-Sept. 12, 1980	Intensive data recovery
37	Aug. 25-29, 1980	Summary feedback session and site demobilization

Site 22IT563 Schedule

Work Week	Calendar Date	Activity
35	Sept 1-5, 1980	Establish field operations
36	Sept 8-12, 1980	Coring and interpretation
37-40	Sept 15-Oct. 10, 1980	Intensive data recovery
41.1-.2	Oct. 13-14, 1980	First feedback session
41-46	Oct. 13-Nov. 21, 1980	Intensive data recovery
47.1-.2	Nov. 24-25, 1980	Second feedback session
47.1-51	Nov. 24, 80-Jan. 9, 81	Intensive data recovery
52	Jan. 12-16, 1981	Summary feedback session and site demobilization

Site 22IT539 Schedule

Work Week	Calendar Date	Activity
42	Oct. 20-24, 1980	Establish field operations
43	Oct. 27-31, 1980	Coring and interpretation
44-46	Nov. 3-21, 1980	Intensive data recovery
47.1-.2	Nov 24-25, 1980	First feedback session
47-51	Nov 24-Jan. 9, 1981	Intensive data recovery
52.1-.2	Jan. 12-13, 1981	Second feedback session
52-57	Jan. 12-Feb. 20, 1981	Intensive data recovery
58	Feb. 23-27, 1981	Summary feedback session and site demobilization

Site 22MO531 Schedule

Work Week	Calendar Date	Activity
38-41	Sept. 22-Oct. 17, 1980	Testing of the site

Table 14. Site 22MO675 Schedule

Work Week	Calendar Date	Activity
38-39	Sept. 22-Oct. 3, 1980	Testing of the site

Site 22MO772 Schedule

Work Week	Calendar Date	Activity
40-41	Oct. 6-17, 1980	Testing of the site

Site 22IT576 Schedule

Work Week	Calendar Date	Activity
53.1-.3	Jan. 19-21, 1981	Site mobilization
35	Jan. 19-28, 1981	Coring and interpretation
54-55	Jan. 26-Feb. 6, 1981	Intensive data recovery
56.1-.2	Feb. 9-10, 1981	First feedback session
56-57	Feb. 9-20, 1981	Intensive data recovery
58	Feb. 23-24, 1981	Summary feedback session and site demobilization

Site 22MO752 Schedule

Work Week	Calendar Date	Activity
59	Mar. 2-6, 1981	Site mobilization
60	Mar. 9-13, 1981	Coring and interpretation
61	Mar. 16-20, 1981	Intensive data recovery
62.1-.2	Mar. 23-24, 1981	First feedback session
62-63	Mar. 23-Apr. 3, 1981	Intensive data recovery
64.1-.2	Apr. 5-6, 1981	Second feedback session
64-67	Apr. 5-May 1, 1981	Intensive data recovery
68	May 4-8, 1981	Summary feedback session and site demobilization

MASTER SCHEDULE

Work Week	Calendar Date	Activity
1-3	Jan. 7-25, 1980	Preparation of field headquarters
4-5	Jan. 28-Feb. 8, 1980	Intensive Seminar
6	Feb. 11-15, 1980	221T576: Establish field operations
7	Feb. 18-22, 1980	221T576: Coring and analysis
8-15	Feb. 25-April 18, 1980	221T576: Intensive data recovery
10	March 10-14, 1980	221T539: Establish field operations
11	March 17-21, 1980	221T539: Coring and interpretation
12-18	March 24-May 9, 1980	221T539: Intensive data recovery
16.1-.2	April 21-22, 1980	221T576: First feedback session
16-24	April 21 June 20, 1980	221T576: Intensive data recovery
19.1-.2	May 11-12, 1980	221T539: First feedback session
19-27	May 11-July 11, 1981	221T576: Intensive data recovery
25.1-.2	June 23-24, 1980	221T576: Second feedback session
25-33	June 23-Aug 22, 1980	221T576: Intensive data recovery
28.1-.2	July 14-15, 1980	221T539: Second feedback session
28-36	July 14-Sept. 12, 1980	221T539: Intensive data recovery
34	Aug. 25-29, 1980	221T576: Summary feedback session and demobilization
35	Sept 1-5, 1980	221T563: Site mobilization
36	Sept 8-12, 1980	221T563: Coring and interpretation
37-40	Sept 15-Oct. 10, 1980	221T563: Intensive data recovery
37	Sept.15-19, 1980	221T539: Summary feedback session and interpretation
38-41	Sept. 22-Oct. 17, 1980	22MO531: Testing
41.1-.2	Oct. 13-14, 1980	221T563: First feedback session
41-46	Oct. 13-Nov. 21, 1980	221T563: Intensive data recovery
38-39	Sept. 22-Dec. 3, 1980	22MO675: Testing

Table 18. MASTER SCHEDULE (cont.)

Work Weeks	Calender Date	Activities
40-41	Oct. 6-17, 1980	22M0772: Testing
42	Oct. 20-24, 1980	22IT590: Site mobilization
43	Oct. 27-31, 1980	22IT590: Coring and interpretation
44-46	Nov. 3-21, 1980	22IT590: Intensive data recovery
47.1-.2	Nov 24-25, 1980	22IT590: First feedback session
47.1-.2	Nov. 24-25, 1980	22IT563: Second feedback session
47-51	Nov. 24-Jan. 9, 1981	22IT563: Intensive data recovery
47-51	Nov. 24-Jan. 9, 1981	22IT590: Intensive data recovery
52	Jan. 12-16, 1981	22IT563: Summary feedback session and site demobilization
52.1-.2	Jan. 12-13, 1981	22IT590: Second feedback session
52-57	Jan. 12-Feb. 20, 1981	22IT590: Intensive data recovery
53.1-.3	Jan. 19-21, 1981	22M0710: Site mobilization
53	Jan. 19-23, 1981	22M0710: Coring and interpretation
54-55	Jan. 26-Feb. 6, 1981	22M0710: Intensive data recovery
56.1-.2	Feb. 9-10, 1981	22M0710: First feedback session
56-57	Feb. 9-20, 1981	22M0710: Intensive data recovery
58	Feb. 23-27, 1981	22M0710: Summary feedback session and site demobilization
58	Feb. 23-27, 1981	22IT590: Summary feedback session and site demobilization
59	March 2-6, 1981	22M0752: Site mobilization
60	March 9-13, 1981	22M0752: Coring and interpretation
61	March 16-20,1981	22M0752: Intensive data recovery
62.1-.2	March 23-24,1981	22M0752: First feedback session

62-63	March 23-Apr. 3,1981	22M0752: Intensive data recovery
64.1-.2	April 5-6, 1981	22M0752: Second feedback session
64-67	April 5-May 1, 1981	22M0752: Intensive data recovery
68	May 4-8, 1981	22M0752: Summary feedback session and site demobilization

MASTER SCHEDULE (cont.)

Work Weeks	Calender Date	Activities
69	May 11-15, 1981	Demobilize field operation and return to University
70-82	May 18-Aug. 14, 1981	Preparation of Interim Report
83	Aug. 17-21, 1981	Deliver Interim Report

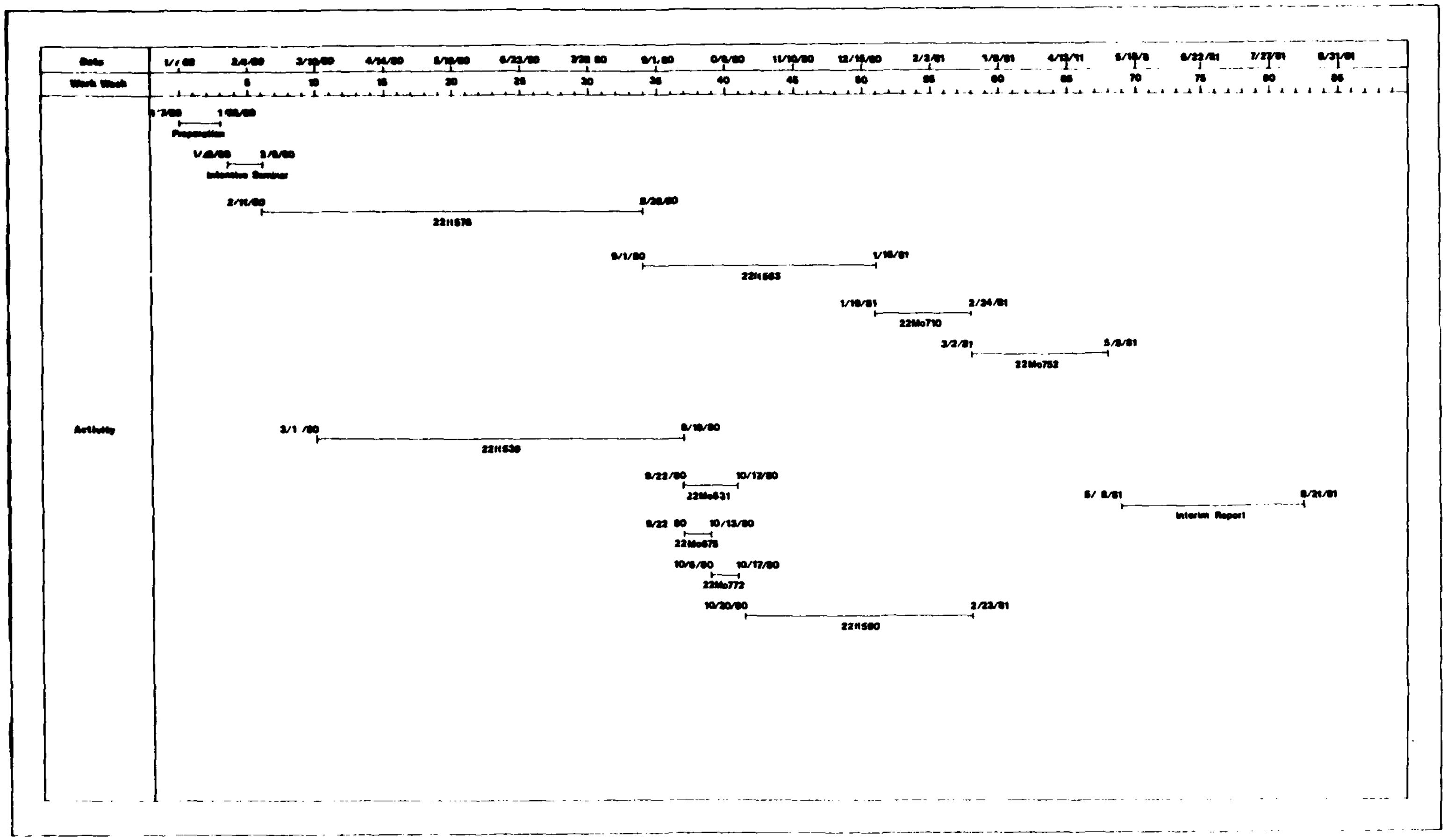


Figure 20. Master Schedule Chart

APPENDIX D

JOB DESCRIPTIONS

Resumes of all proposed supervisory positions are on file at the Corps of Engineers Office in Mobile, Alabama.

Director of Office of Archaeological Contracts

(Dr. Dallas Blanchard)

The Director is plan, develop, and establish the policies and objectives of the Office of Archaeological Contracting in acordance with the Department of Sociology and Anthropology and the Office of Sponsored Research. The Director is responsible for the performance of contractual obligations assumed by the Office of Archaeological Contracting and therefore monitors and reviews all reports, schedules, procedures, and financial statements to determine progress and status. This includes organizing office operations in the production of all correspondence, proposals, and reports. The Director also directs personnel administration and funding procurement.

Principal Investigator

(Dr. Judith Bense)

The primary responsibility of the Principal Investigator is to insure that all contractual requirements of the project are met. This includes responsibility for all aspects of the project. This position will insure that professional standards and practices are maintained and an awareness of all sections of the project will be made at all times. The Principal Investigator will be the primary interface with the Federal Archaeologists, the University Administration, the Director of the Office, the public, and the outside consultants. In addition, co-ordination of all Field and Lab Directors and the data management system is necessary.

Co-Principal Investigator (Administrative)

The Co-Principal Investigator acts as a liason between the OAC/UWF and the project field office in matters regarding the budget, reports, and personnel records, and between the project and the host community in commerce and public relations. The Co-Principal Investigator will assist the Principal Investigator in maintaining quality personnel and in resolving any employee problems. In general, the Co-principal Director must assist the Principal Director in problem solving whenever and where ever problems arise.

Research Associate

(Mr. David Dye)

The position of the Research Associate includes responsibility for coordinating the writing and editing of the research design, interim report, and Phase II and III proposals; generating a project style guide that meets the Corps of Engineers Contracting Officer's approval; maintaining the hypothesis file; and coordinating personal research projects. This position also entails maintaining a familiarity with the current anthropological literature that is relevant to this project to ensure that all project documents are up to date.

Field Director

(Mr. Michael Rodeffer)

(Mr. Joseph Studer)

The Field Director is to direct the excavation of the assigned sites in an ordered and effcient manner; to co-author, with the Laboratory Director, the reports of these excavations; and to manage the field personnel and equipment. Interaction with the other Field Director is expected so that continuity of excavation methods is maintained. Interaction of the Laboratory and Field Director is to maintain maximum information feedback during the investigation and report preparation of each site.

Input is expected at all levels of the project. This includes but is not limited to research directions, hypotheses generation and testing, and authoring sections of the reports required by this project. Each month the field director will submit to the Principle Investigator a report of the progress achieved.

Assistant Field Director

(Mr. Harry Reed)

(Ms. Elizabeth Duggan)

The primary responsibility of the Assistant Field Director will be to assist the Field Director in carrying out the daily detail of excavation. This includes supervising the assignment of identification numbers, data forms, unit excavations, and mapping and monitoring of quality control. In addition, duties such as time keeper, supply officer, and personnel manager of the excavatio staff will be necessary. Interaction with the Assistant Laboratory Director wil be necessary to transfer data from the field to the lab.

Laboratory Director

(Mr. Blaine Ensor)

The Laboratory Director is to direct the processing and analysis of all cultural material of the assigned sites in an ordered and efficient manner; to co-author, with the Field Director, the reports of these investigations; and to manage the laboratory staff and equipment. Interaction with the other Laboratory Director is expected so that continuity of analytical procedures will be maintained. Interaction will be necessary with the Field Director to maintain maximum information feedback during excavation of the site and report preparation for the feedback summarizations, which are scheduled periodically during the investigation of a site.

Input is expected at all levels of the project. This includes but is not limited to research directions, hypotheses generation and testing, and authoring sections of the reports required by this project.

Assistant Laboratory Director

(Ms. Laura Maness)

(Ms. Susan Smith)

This position is designed to assist the Laboratory Director. The primary duties are to check in all materials from the field; to supervise the processing of all materials in the laboratory and the mapping of floor plans and artifact distribution; to manage the laboratory staff; and to act as time keeper and supply officer for the laboratory. Interaction with the Assistant Field Director will be necessary to transfer data from the field to the lab.

Team Leaders (Field)

Keith Landreth	James Evans
Mary Standifer	Russel Holloway
Dale Ekberg	Rick Anderson
Merril Dicks	Rick Atwell

Team Leaders are responsible to the Field Assistant in a task-specific situation. They are usually in charge of one to four crew members in data recovery procedures.

Crew Members (Field)

Crew Members are responsible for performance of specific tasks as directed by supervisory personnel. Salaries will be assigned on basis of previous experience and special skills of individuals.

Team Leaders (Laboratory)

Jefferson Thompson	Robert Skrivan
Jean Wilson	Rebecca Brown
Patricia McRee	

Team Leaders are responsible to the Laboratory Assistant in task-specific situation. They are usually in charge of one to four crew members in data processing procedures.

Crew Members (Laboratory)

Crew Members are responsible for performance of specific tasks as directed by supervisory personnel. Salaries will be assigned on the basis of previous experience and special skills of individuals.

Data Assistant

(Mr. Andrew G. Mills)

The Data Assistant directs three person crew in the processing of coded archaeological information which goes into project computer system. The information is monitored for accuracy and quantit. The Data Assistant is responsible to the Date Manager.

APPENDIX E

FIELD FORMS

Recorder ______________

Started ______________

Finished ______________

EXCAVATION DATA: 22_ _ _ _ _

Block ______

GENERAL

ID No.: (1) _ _ _ _ _

Master ID: (58) _ _ _ _ _

Unit Coordinates, NE Corner:

(2) _ _ _ . _ _ S

(3) _ _ _ . _ _ W

Unit Category: (4) _ _

1. 1/2 x 1/2
2. 1 x 1
3. 2 x 2
4. 4 x 4
5. Feature
6. Special Sample

99. Other; Specify, 3 words max:

(5-7)________________________

Level No.--Subdivision: (10) _ _ - _

Stratum No. -Subdivision: (11)_ _ . _

Horizontal Subdivision: (8)_____

1. Half 2. Quadrant

Hrzntl. Sbdvsn. Description: (9)

1. North	5. Northeast
2. East	6. Southeast
3. South	7. Southwest
4. West	8. Northwest

Top Elevation: (12) _ _ _ . _ _

Bottom Elevation: (13) _ _ _ . _ _

Unit Volume (m^3): (14) _ _ _ . _ _

RECOVERY

Type: (56) ___

Percent Screened: (57) _ _ _ . _ _

1. 1/4 in 2. 1/4 in + fine 3. Sieve

SOIL

Hue: (48) _ _ . _/_

1. Y	3. R
2. YE	4. Gley

If Gley (4), specify: (49) _ _ _ _/_

Value: (50) _ . _

Chroma: (51) ___

Soil Type: (52) _ _

1. Clay	8. Loamy Sand
2. Sandy Clay	9. Sandy Loam
3. Silty Clay	10. Loam
4. Clay Loam	11. Silt Loam
5. Sandy Clay Loam	12. Silt
6. Silty Clay Loam	13. Gravel
7. Sand	

14. Other; Specify, 3 words max.:

(53-55) ________________________

ID. No. _ _ _ _ _

SPECIAL SAMPLE

Type (15) _ _

1. Archaeol Mag
2. Macro Botanical
3. C-14
4. Pollen
5. Soil
6. Platted Specimen
7. Biosilicate
8. Lipid
9. Perpetuity
10. Fine-screen
11. Chemical Core
99. Other; Specify, 3 words max.:

(16-18) ______________________________

Center-point Coordinates:

(19) _ _ _ . _ _ S

(20) _ _ _ . _ _ W

Top Elevation: (21) _ _ _ . _ _

Sample Volume ( ):(59) _ _ _ . _

FEATURE

Number (22) _ _ _

Type: (23) _ _ _

1. Clay Surface
2. Hearth
3. Pit
4. Post Hole Pattern
5. Burial Pit
6. Human Burial
7. Animal Burial
8. Cache
9. Bone Cluster
10. Ceramic Cluster
11. Chipped Lithic Cluster
12. Ground Stone Cluster
13. Rock Cluster
14. Burned Clay Cluster
15. Soil Stain
99. Other; Specify, 3 words max.:

____

Horizontal Subdivision: (24) ___

1. Half 2. Quadrant 3. Segment

Hrzntol. Sbdvsn. Description: (25) ___

1. North
2. East
3. South
4. West
5. Northeast
6. Southeast
7. Southwest
8. Northwest

Level No.--Subdivision: (26) _ _ - _

Stratum No.--Subdivision: (27) _ _ - _

Length Coordinates (x & x'):

x: (28) _ _ _ . _ _S; (29) _ _ _ . _ _W

x': (30) _ _ _ . _ _S; (31) _ _ _ . _ _W

Width Coordinates (y and y'):

y: (32) _ _ _ . _ _S; (33) _ _ _ . _ _W

y': (34) _ _ _ . _ _S; (35) _ _ _ . _ _W

Center-point Coordinates:

(36) _ _ _ . _ _ S; (37) _ _ _ . _ _ W

Top Elevation: (38) _ _ _ . _ _

Bottom Elevation: (39) _ _ _ . _ _

Plan View: (40) ___

1. Oval
2. Rectangular
3. Round
4. Square
5. Irregular
9. Other; Specify, 3 words max.:

(41-43) ______________________________

Profile: (44) _ _

1. Basin
2. Belled
3. Flared
4. Hourglass
5. Lens
6. Rectangular
7. Stepped
8. Triangular
9. Irregular
10. Other; Specify, 3 words max.:

(45-47) ______________________________

Recorder ________________

Started _____/_____/____

Finished _____/_____/____

LEVEL/STRATUM SUMMARY RECORD: 22 _ _ _ _ _

Block _____

Unit Type: ________; Coordinates: ________S ________W; Master ID: _ _ _ _ _

BM: _________; BM Elev.: _________; H.I.: _________: Unit Volume: _ _ . _ _ _ m^3

Level No.: ___/____; Elev.:_________ to _________; Thickness: _________

Stratum No.: ___/____; Min. Thickness: _________; Max. Thickness: _________

Unit Floor Elevations: NE _____; SE _____; SW _____; NW _____; Ctr _____

ID Nos., Level/ Stratum: ____

Special Samples, Type & ID: _________-_________ _________-_________

_________-_________ _________-_________ _________-_________

_________-_________ _________-_________ _________-_________

Excavation & Recovery: Surf. Col. ___; Cntrl. Surf. Col. ___; Shovel ___; Trowel ___;
Shovel & Trowel ___: Machinery ___; Other ________________________________
Unscreened ___; Screened: Wet ___; Dry ___; 1/4 in ___; 1/4 in & fine ___; Sieve ____

ARTIFACT SUMMARY --SEE ATTACHED

Features, Originating: ____

Features, Continuing: ____

Soil Description (Munsell Color, Texture, Disturbances/Intrusions & Other Comments):

____

____

____

____

Additional Comments: ____

____

____

____

____

LEVEL/STRATUM SUMMARY RECORD: 22 _ _ _ _ _

Photos: B&W ______, Date(s) __________; Transparencies _____, Date(s) ________

____

Drawings: Plan _____; Profile - N, S, E, W; Other ____________________________

Approved ______________________________

Unit:

__________S __________W

Level/Stratum: ___--___

Master ID: _ _ _ _ _

By: ____________________

Date: _____/_____/_____

Recorder ______________

Started _____/_____/_____

Finished _____/_____/_____

FEATURE RECORD: 22 _ _ _ _ _

Block ______

Feature No.: __________; Type: __________; Master ID: ________

BM: ____________; BM Elevation: __________; H.I. ___________

Level/Stratum Recognized: __________; Level/Stratum of Origin: ____________

Provenience: Length--(x) ______ . ____S/ ______ . ____W; Elev. ______ . ____

(x') ______ . ____S/ ______ . ____W; Elev. ______ . ____

Width --(y) ______ . ____S/ ______ . ____W; Elev. ______ . ____

(y') ______ . ____S/ ______ . ____W; Elev. ______ . ____

Center-point ______ . ____S/ ______ . ____W; Elev. ______ . ____

Elevation of Top: ______ . ____; Bottom: ______ . ____; Volume _ _ . _ _ _ ( )

ID Nos., Feature Subdivisions: ____

Special Samples, Type & ID: __________-__________ __________-__________

__________-__________ __________-__________ __________-__________

__________-__________ __________-__________ __________-__________

Excavation & Recovery: Surf. Col. ___; Cntrl. Surf. Col. ___; Shovel ___; Trowel ___;
Shovel & Trowel ___: Machinery ___; Other ______________________________________
Unscreened ___; Screened: Wet ___; Dry ___; 1/4 in ___; 1/4 in & fine ___; Sieve ____

Description of Fill & Matriz (Munsell Color, Texture, Contents & Notes):

____

____

____

____

Stratigraphic Relationships (Superimposed on/by): ____________________________

____

Feature No. ____________ Master ID: _ _ _ _ _

Center-point _____ . ___S _____ . ___W Drawn by ____________________

Date _______________ Include two grid points, visual scale, and North arrow.

FEATURE RECORD: 22 _ _ _ _ _

Feature No.: ________: Center-point: ______ . ____S/ ______ . ____W

Associated Features: ____

____

____

Artifactual Material Associated with Feature: (See Attach Lab Analysis)

	Absent	Sparse	Medium	Heavy
Chipped Stone	____	____	____	____
Ground Stone	____	____	____	____
Other Lithics	____	____	____	____
Debitage	____	____	____	____
Ceramics	____	____	____	____
Human Remains	____	____	____	____
Animal Bone	____	____	____	____
Shell	____	____	____	____
Metal	____	____	____	____

Other ____

General Comments, Miscellaneous Notes & Description: ____________________

____

____

____

____

____

____

____

Probable Cultural Affiliation: Paleo-Indian ___; Archaic ___; Gulf Form. ___;

Woodland ___; Mississippian ___; Protohistoric ___; Historic ___; Unknown ___;

Other ____

Basis for Probable Cultural Affiliation: ____________________________

____

____

Photos: B/W ________, Date(s) ________; Transparencies _______, Date(s)______

____

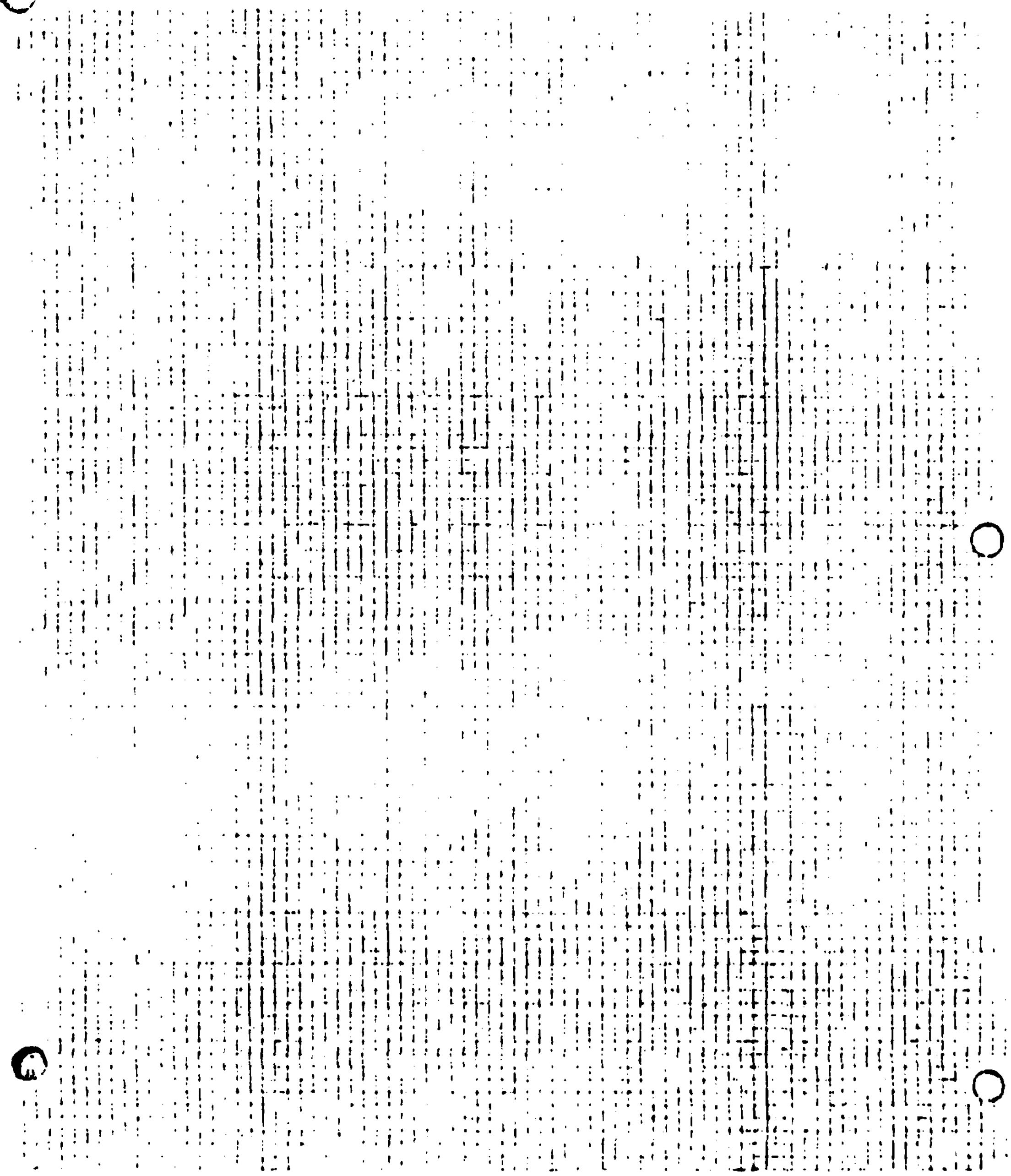
Drawings: Profile - N, S, E, W; Plan _____; Other ____________________

Approved ____________________________

Feature No. ________ Master ID: ____

Center-point _____ . ___S _____ . ___W Drawn by ______________

Date ____/____/____ *Include two grid points, visual scale, and North arrow.*



MIDDEN MOUND PROJECT--SPECIAL SAMPLE RECORD

SITE: Recorder ____________

BLOCK: ________ Started (5) ____ /(6) ____ /(7) ____

MASTER ID: (58) ________ Finished ____ / ____ / ____

Unit Cat.: (4) ______; Coordinates: (2) ____S (3)____ W; Level: (10) ___-___; Elev: (12) ___.___ to (13) ___.___

1. Archaeo Mag 2. Macrobotanic 3. C-14 4. Pollen 5. Soil 6. Plotted specimen 7. Biosilicate
8. Lipid 9. Perpetuity 10. Fine-screen 11. Chemical core 99. Other; specify, 3 words maximum

ID# (1)	TYPE (15)	CENTER POINT (19)		(20)		ELEV. (TOP) (12)	VOL. (4) (59)	DESCRIPTION
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	
		.	S	.	W	.	.	

APPENDIX F

CODE LISTS AND CODING SHEETS

VAR 0	SITE
VAR 1	I.D NUMBER
VAR 60A	CERAMIC COUNT
VAR 61A	CERAMIC WEIGHT
VAR 62A	CERAMIC TYPE
VAR 63A	LITHIC COUNT
VAR 64A	LITHIC WEIGHT
VAR 65A	LITHIC TYPE
VAR 66A	LITHIC CATEGORY
VAR 67A	LITHIC RAW MATERIAL

VAR 67A

Raw Material

01 Heat-treated Tuscaloosa Gravel
02 Yellow Chert (unheated Tuscaloosa Gravel)
03 Heat-treated Camden
04 Unheated Camden
05 Fossiliferous Bangor
06 Blue-Green Bangor
07 Little Mountain Bangor
08 Fort Payne
09 Fossiliferous Fort Payne
10 Tallahatta Quartzite
11 Coastal Plain Agate
12 Quartz
13 Quartzite
14 White Chert
15 Pickwick
16 Novaculite
17 Cumberland
18 Sandstone
19 Ferrigenous Sandstone
20 Conglomerate
21 Limonite
22 Hematite
23 Siltstone
24 Greenstone
25 Steatite
26 Shale
27 Unidentified
28 Petrified Wood
29 Jasper
30 Galena
31 Chalcedony
32 Oolitic
33 Flint Ridge
34 Schist
35 Ochre
36 Anthracite
37 Gray Buffalo River
38 Unheated - Unident.
39 Heated - Unident.

VAR 66A

TYPE 10 - Introduced

01 Conglomerate
02 Chalk
03 Limestone
04 Unmodified Cobbles/Pebbles
05 Non-utilized Fire Cracked Chert Chunks
06 Galena
07 Fire Cracked Quartzite
08 Ferrigenous Sandstone
09 Sandstone
10 Petrified Wood
11 Hematite
12 Limonite
13 Unworked Hollow Sandstone Concretions
14 Siltstone
15 Slag
16 Crinoids
17 Fossils
18 Void
19 Clay Balls
20 Quartz
21 Graphite
22 Ochre
23 Anthracite
24 Manganese Nodule
25 Unident.
26 Steatite

TYPE 11 - Biotics and Other Materials

VAR 66A

01 Unmodified Bone
02 Modified Bone
03 Charcoal
04 Historic
05 Debris
06 Other (shell)
07 Debris - < 1/4" debitage
08 Debris - < 1/4" introduced rock
09 Debris - < 1/4" bone
10 Debris - < 1/4" ceramics
11 Debris - < 1/4" unid. chipped stone

TYPE 08 - Ground Stone Tools

01 Hammerstone
02 Anvilstone
03 Pitted Anvilstone
04 Hammer/Anvilstone
05 Abrader
06 Muller
07 Mortar
08 Pestle
09 Grooved Axe
10 Void
11 Celt
12 Gorget
13 Atlatl Weight
14 Discoidal
15 Bead
16 Void
17 Hoe Chip
18 Steatite Sherds
19 Sandstone Sherds
20 Worked Hollow Sandstone Concretions
21 Ground Limonite
22 Ground Hematite
23 Edge Ground Cobble
24 Unident. Ground/Polished Stone
25 Other (Ground Flake)
26 Muller/Pitted Anvilstone
27 Drill Core
28 Bead Preform
29 Muller/Hammerstone
30 Boatstone
31 Anvilstone/Chopper
32 Ground PP/k
33 Tubular Pipe
34 Abrader/Anvilstone
35 Mortar/Anvilstone
36 Void
37 Mortar/Pitted Anvilstone
38 Pitted Anvilstone/Abrader
39 Grooved Arbrader/Hammerstone/Pitted Anvilstone
40 Awl

AD-A126 693 ARCHAEOLOGICAL INVESTIGATIONS IN THE UPPER TOMBIGBEE VALLEY MISSISSIPPI:..(U) UNIVERSITY OF WEST FLORIDA PENSACOLA OFFICE OF CULTURAL AND A.. J A BENSE ET AL. 1983 DACW01-80-C-0063

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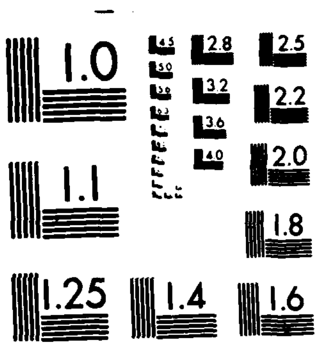

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TYPE 09 - Lithic Debitage

01 1" Nonutilized
02 1" Utilized
03 ½" Nonutilized
04 ½" Utilized
05 ¼" Nonutilized
06 ¼" Utilized
07 Fire Cracked Chert Chunks - Utilized
08 Prismatic Blade Nonutilized
09 Prismatic Blade Utilized
10 Other

VAR 66A

TYPE 07 - Other Uniface and Biface Tools

01 Uniface Chopper
02 Biface Chopper
03 Uniface Adze
04 Biface Adze
05 Uniface Flake Knife
06 Biface Flake Knife
07 Uniface Cobble Knife
08 Biface Cobble Knife
09 Biface Digging Implement
10 Unident. Chipped Stone Frag.
11 Other
12 Wedge
13 Chipped Axe
14 Hammerstone/Chopper
15 Chisel
16 Burinated Biface (Recycled)
17 Chisel/Adze (Diag.)
18 Biface Flake Knif/Spokeshave
19 Biface knife on heat spall
20 Piece Esquille
21 Piece Esquille on a biface (Recycled)

VAR 66A

TYPE 05 - Scrapers

01 Uniface side scraper on blade/blade-like flake
02 Uniface end scraper on blade/blade-like flake
03 Uniface side-end scraper on blade/blade-like flake
04 Uniface side scraper on expanding flake
05 Uniface end scraper on expanding flake
06 Uniface side-end scraper on expanding flake
07 Uniface side scraper on other flake
08 Uniface end scraper on other flake
09 Uniface side-end scraper on other flake
10 Uniface end scraper on thermal spall
11 Uniface side scraper on thermal spall
12 Uniface side-end scraper on thermal spall
13 Biface side hafted end scraper
14 Uniface cobble scraper
15 Biface cobble scraper
16 Scraper on biface (frag.) (Recycled)
17 Scraper on core (Recycled)
18 Notched flake/spokeshave
19 Unident. scraper frag.
20 Other
21 Ovoid biface scraper
22 Biface scraper on a flake
23 Graver/scraper
24 Uniface hafted end scraper
25 Spoleshave & Biface side Scraper
26 Notched flake/spokeshave (Recycled)
27 Ovoid biface scraper (Recycled)
28 Hafted end scraper (Recycled)

TYPE 06 - Drills, Perforators, Etc.

01 Shaft Drill
02 Expanding Base Drill
03 Stemmed Drill (Recycled)
04 Drill Frag. - Distal
05 Drill Frag. - Medial
06 Reamer
07 Perforator
08 Graver
09 Microlith
10 Denticulate
11 Other
12 Micro Perforator
13 Reamer (Recycled)
14 Perforator (Recycled)

VAR 66A

TYPE 02 - Bifaces

01 Ovoid Biface Blade - Flake
02 Ovoid Biface Blade - Other
03 Triangular Biface Blade - Flake
04 Triangular Biface Blade - Other
05 Nar. Triangular Biface Blade - Flake
06 Nar. Triangular Biface Blade - Other
07 Exp. Triangular Biface Blade - Flake
08 Exp. Triangular Biface Blade - Other
09 Broad Based Triang. Biface Blade - Flake
10 Broad Based Triang. Biface Blade - Other
11 Biface Blade Proximal Frag.
12 Biface Blade Medial Frag.
13 Biface Blade Distal Frag.
14 Biface Other
15 Rehafted Biface Frag. (Recycled)

TYPE 03 - Preforms

01 Preform 1 - Cobble
02 Preform 1 - Flake
03 Preform 1 - Ind.
04 Preform 2 - Cobble
05 Preform 2 - Flake
06 Preform 2 - Ind.
07 Quarry Blades
08 Preform Other

TYPE 04 - Cores

01 90° - Unifacial
02 90° - Bifacial
03 180° - Unifacial Opposing
04 180° - Bifacial Opposing
05 180° - Unifacial Adjacent
06 180° - Bifacial Adjacent
07 270° - Unifacial
08 270° - Bifacial
09 360° - Unifacial
10 360° - Bifacial
11 Bipolar Core
12 Blade Core
13 Microblade Core
14 Core Fragments
15 Core Other

VAR 66A

TYPE 01 - Projectile Point Knives

01 Adena LA
02 Baker's Creek M1-2
03 Beaver Lake EA
04 Benjamin M1-2
05 Benton Barbed LA
06 Benton Extended Stem LA
07 Benton Short Stemmed LA
08 Big Sandy EA
09 Bradley Spike M1-2
10 Buzzard Roost Creek LA
11 Camp Creek M1-2
12 Clovis P
13 Collins BM
14 Coosa M1-2
15 Coosa Notched M1-2
16 Copena M1-2
17 Copena Triangular M1-2
18 Cotaco Creek LA
19 Crawford Creek MA
20 Cumberland P
21 Cypress Creek EA
22 Dalton EA
23 Damron EA
24 Ebenezer M1-2
25 Elora LA
26 Eva MA
27 Flint Creek GF
28 Flint River Spike M1-2
29 Gary LA
30 Greenbriar EA
31 Greenville M1-2
32 Hardaway EA
33 Jack's Reef Corner Notched BM
34 Kays LA
35 Kirk Corner Nothched EA
36 Late Woodland-Miss. Triang. BM
37 Lecroy EA
38 Ledbetter/Pickwick LA
39 Limestone LA
40 Little Bear Creek LA
41 McCorkle Stemmed EA
42 McIntire LA
43 Morrow Mountain MA
44 Morrow Mt. Rounded Base MA
45 Morrow Mt. Straight Stem MA
46 Motley LA
47 Mud Creek M1-2
48 Pickens Triangular BM
49 Quad P
50 Residual Steemed LA

VAR 66A

TYPE 01 - Projectile Point Knives

51 St. Albans EA
52 Stanley EA
53 Swan Lake M1-2
54 Sykes/White Springs MA
55 Tombigbee Stemmed M1-2
56 Vaughn MA
57 Wade LA
58 Unident PP/K Distal Frag.
59 Unident PP/K Medial Frag.
60 Unident PP/K Proximal Frag.
61 Unfinished Small Triangular PP/K BM
62 Residual Side Notched EA
63 Kirk Stemmed EA
64 Big Slough LA
65 Savannah River LA
66 Residual Triangular
67 Plevna

VAR 65A

Morphological Type

01	Projectile Point Knives
02	Bifaces
03	Preforms
04	Cores
05	Scrapers
06	Drills, Perforators, Etc.
07	Other Uniface and Biface Tools
08	Ground Stone Tools
09	Lithic Debitage
10	Introduced Rock

VAR 62A

Ceramics Temper

	043	Turkey Paw Plain ND
	044	Turkey Paw Plain D
Bone	045	Turkey Paw Cord Marked ND
Temp.	046	Turkey Paw Cord Marked D
	047	Eroded Bone Tempered ND
	048	Eroded Bone Tempered D
	049	Bone Tempered Other ND
	050	Bone Tempered Other D
	051	Alexander Incised ND
	052	Alexander Incised D
	053	Alexander Pinched ND
	054	Alexander Pinched D
	055	Alexander Incised/Pinched ND
	056	Alexander Incised/Pinched D
	057	Alexander Incised/Punctated ND
	058	Alexander Incised/Punctated D
	059	Columbus Punctated ND
	060	Columbus Punctated D
	061	O'Neal Plain ND
Sand	062	O'Neal Plain D
Temp.	063	Baldwin Plain ND
	064	Baldwin Plain D
	065	Residual Sand Tempered Plain ND
	066	Residual Sand Tempered Plain D
	067	Saltillo Fabric Marked ND
	068	Saltillo Fabric Marked D
	069	Furrs Cord Marked ND
	070	Furrs Cord Marked D
	071	Eroded Sand Tempered ND
	072	Eroded Sand Tempered D
	073	Sand Tempered Other ND
	074	Sand Tempered Other D
	075	Wheeler Plain ND
	076	Wheeler Plain D
	077	Wheeler Dentated Stamped ND
	078	Wheeler Dentated Stamped D
Fiber	079	Wheeler Punctated ND
Temp.	080	Wheeler Punctated D
	081	Wheeler Simple Stamped ND
	082	Wheeler Simple Stamped D
	083	Eroded Fiber Tempered ND
	084	Eroded Fiber Tempered D
	085	Fiber Tempered Other ND
	086	Fiber Tempered Other D
	087	Sherdlets
	088	Fired Clay
	089	Daub

ARTIFACT INFORMATION SHEETS

VAR 62A

Ceramics Temper

001 Bell Plain ND
002 Bell Plain D
003 Mississippi Plain ND
004 Mississippi Plain D
005 Decorated Shell Temp. ND
006 Decorated Shell Temp. D
007 Eroded Shell Temp. ND
008 Eroded Shell Temp. D
009 Shell/Gorg ND
010 Shell/Gorg D

011 Baytown Plain ND
012 Baytown Plain D
013 Mulberry Creek Cord Marked ND
014 Mulberry Creek Cord Marked D
015 Alligator Incised ND
016 Alligator Incised D
017 Wheeler Check Stamped ND
018 Wheeler Check Stamped D
019 Cormorant Cord Imp. ND
020 Cormorant Cord Imp. D
021 Withers Fabric Marked ND
022 Withers Fabric Marked D
023 Eroded Grog Tempered ND
024 Eroded Grog Tempered D
025 Grog Tempered Other ND
026 Grog Tempered Other D

027 Mulberry Creek Plain ND
028 Mulberry Creek Plain D
029 Pickwick Comp. Stamped ND
030 Pickwick Comp. Stamped D
031 Wright Check Stamped ND
032 Wright Check Stamped D
033 Bluff Creek Simple Stamped ND
034 Bluff Creek Simple Stamped D
035 Flint River Cord Marked ND
036 Flint River Cord Marked D
037 Long Branch Fabric Marked ND
038 Long Branch Fabric Marked D
039 Eroded Limestone Tempered ND
040 Eroded Limestone Tempered D
041 Limestone Tempered Other ND
042 Limestone Tempered Other D

APPENDIX G

SCIENTIFIC NAMES OF PLANTS AND ANIMALS

SCIENTIFIC NAMES OF PLANTS AND ANIMALS

Animals

Mammals	
black bear	(*Ursus americanus*)
dog	(*Canis familaris*)
opossum	(*Didlphis marsupialis*
rabbit	(*Sylvilagus*)
raccoon	(*Procyon lotor*)
squirrel	(*Sciurus*)
white-tailed deer	(*Odocoileus virginianus*)
Birds	
passenger pigeon	(*Ectopiste migratorius*)
quail	(*Colinis virginianus*)
waterfowl	
wild turkey	(*Meleagris gallopavo*)
Fish	
bass	(*Centrarchidae*)
bowfin	(*Amia Calva*)
buffalo	(*Ictiobus*)
catfish	(*Ictalurus*)
freshwater drum	(*Apodinotus grunniens*)
gar	(*Lepisosteus*)
jack	
lake sturgeon	(*Acipenser fulvescens*)
perch	
red horse	(*Mosostoma*)
suckers	(*Catostomidae*)
Reptiles	
snapping turtle	(*Chelydra serpentina*)
softshell turtle	(*Trionyx*)
Mussels	(*Unionids*)

Plants

American lotus	(Nelumbo lutea)
American chestnut	(Castanea dentata)
beans	(Phaseolus)
badstraw	(Galium)
blackberries	(Rubus)
black walnut	(Jaglans nigra)
blueberry	(Vaccinium)
bottle gourd	(Lagenaria siceraria)
butternut	(Juglans cinerea)
canary grass	(Phalaris canariensis)
cane	(Adrundinaria gigantea)
Caroline moonseed	(Coculus carolinus)
carpetweed	(Mollugo verticillata)
cockspursgrass	(Echinochloa beau)
common pawpaw	(Asimina triloba)
common persimmon	(Disopyros virginiana)
corn	(Zea maige)
crab apple	(Malus)
devil's shoestring	(Tephrogia virginiana)
elderberry	(Sambucus candensis)
giant ragweed	(Ambrosia trifida)
goosefoot	(Chenopodium)
grass seeds	(Gramineae)
greenbrier	(Smilax)
groundnut	(Apios americana)
hackberry	(Celtis occidentailis)
hawthorne	(Grataegus)
hazel-nut	(Corylus americana)
honey-locust	(Gleditsia triancanthos)
huckleberries	(Gaylussacia)
Indian hemp	(Apacynum cannabinum)
Jerusalem artichoke	(Helianthus tuberosus)
knotweed	(Polygonum)
marshelder (sumpweed)	(Iva)
maygrass	(Phalaris caroliniana)
maypop	(Passiflora incarnata)
milkweed	(Asclepiodora viridis)
nettles	(Urtica)
Ohio buckeye	(Aesculus glabra)
panic grass	(Panicum)
partridge pea	(Casia fasiculata)
pecan	(Carya illinoensis)
pigweed	(Amaranthus)
pokeweed	(Phytolacca americana)
post oad	(Quercus stellata)
pine	(Pinus)
purselane	(Portulaca oleracea)
ragweed	(Ambrosia)
red mulberries	(Morus rubra)
sassafras	(Sassafras albidum)

Shagbark hickory	(*Carya ouata*)
Solomon's seal	(*Poloygonatum*)
squash	(*Cucurbita pepo*)
sumac	(*Rhus*)
sumpweed (marshelder)	(*Iva*)
sunflower	(*Helianthus annua*)
sweet flag	(*Acorus calamus*)
tick-trefoil	(*Desmodium*)
viburnum	(*Viburnum*)
wild grape	(*Vitis*)
wild onion	(*Allium cernuum*)
wild plum	(*Prunus*)
wild potato vine	(*Ipomoea pandurata*)
wild rice	(*Zizania aquatica*)
wild strawberries	(*Fragaria*)

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